DOCUMENT RESUME

ED 444 487 IR 020 143

AUTHOR	Justice, Madeline, Ed.
TITLE	Diversity and International.
PUB DATE	2000-00-00
NOTE	48p.; In: Society for Information Technology & Teacher Education International Conference: Proceedings of SITE 2000 (11th, San Diego, California, February 8-12, 2000). Volumes 1-3; see IR 020 112.
PUB TYPE	Collected Works - General (020) -- Speeches/Meeting Papers (150)
EDRS PRICE	MF01/PC02 Plus Postage.
DESCRIPTORS	Art Education; *Computer Uses in Education; Cultural Pluralism; *Educational Technology; Elementary Secondary Education; English (Second Language); Equal Education; Higher Education; Navajo (Nation); *Teacher Education
IDENTIFIERS	Access to Technology; Technology Integration

ABSTRACT

This document contains the following papers on diversity and international issues in technology and teacher education: (1) "'At-Risk' Learners and the 'Digital Divide': Exploring the Equity in Access Issue" (Jeanne M. Foster and Sharla L. Snider); (2) "Integrating Standards-Based Instructional Technology" (Nicole M. Snow); (3) "Technology and the Navajo--Its Time Has Come" (Jerry A. Bennett); (4) "A Multifaceted Approach to Integrating Computers in Multicultural Preservice Teaching" (Ines Marquez Chisholm); (5) "'From Tatters to Tapestry': Technology and the Weaving of Cultural Education in the Mainstream Classroom" (Debra A. Suarez); (6) "Gender Representation in Visuals on School Web Pages: Course for In-Service Teachers" (Wendy Maboudian); (7) "Within Student Comparison of ESL Acquisition--Through Content between Virtual and F/F Seminar for ESL and Native Speakers' Negotiated Meaning" (Stephen Carey); (8) "Virtual Interactive Workshop: A Pedagogical Art Education View into the Computer Lab" (Maria Cristina Villanova Biazus); and (9) "Fostering Equity in Pre-College Computing Classrooms" (Sandra Madison, Min Deng, and James Gifford). (Contains 79 references.) (MES)

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Diversity and International

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By Madeline Justice, Ed.

IR020143

DIVERSITY AND INTERNATIONAL

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Entering the new millennium with the discussion of diversity and technology are signs of educators addressing two important factors that provide the sparks that can improve the future. The papers in this section are few but impressive. They suggest ideas and concepts that can be used as an initial beginning or an extension of existing programs. These ideas bring people together because by bridge the gap between cultures through the use of technology.

The papers are all unique in that they stress the importance of helping all young people reach their maximum potential through the use of technology, their gateway to the future. The papers are grouped based on the theme, "bridging the gap through diversity and technology." For example, the first paper by Foster and Snider at Texas Woman's University discuss the importance of bridging the gap between the students who have full access to the latest technology and those who do not. They focus on three essentials that would keep what they call the "digital divide" from getting wider. The inadequate quality of technology use, teacher preparation and exposure to technologically proficient role models in the home present problems that can be solved through a commitment of training and support by administrators and teachers.

The papers by Snow from Northern Arizona University, and Bennett project director for the Navajo Education Technology Consortium, support each other by a focusing on a project that involves 13 school districts in three states, two universities, two community colleges, two departments of education, and the National Indian Telecommunication Institute. Snow's paper focuses on the project design through goals and objectives, training sessions, and first year accomplishments. Bennett's paper describes the project from the director's point of view. He discusses staff development, cultural inclusion and the infrastructure improvements that are being used to usher the Navajo culture into the electronic age.

Continuing in this same vein is the paper by Chisholm from Arizona State University West. He focuses on preparing the young by starting with preservice teacher preparation. The author provides students with an authentic experience that develops diversity awareness and multicultural teaching skills with a secondary purpose of modeling technology integration and expanding student computer competency. Preservice teachers participate in many activities that do not mirror a conventional university course. Aided by technology, the author discusses the limitations and the benefits of working with preservice teachers in this fashion.

The paper by Suarez from the University of Alabama provides another experience grounding teachers in cultural pluralistic concepts that help them move beyond print media, by developing and implementing activities designed for all students. This technological multicultural course provides students with a unique way of developing a meaningful way of sharing aspects of their culture and community.

In another paper, gender representation on school web pages is an important issue investigated by Maboudian from the University of Houston. The study uses semiotic methods to examine web site visuals for evidence of differences in gender presentation. Because pictures send such an important message to the public and to students who view the sites, the author discusses the cybiotic design of visuals on a web page that may suggest either stereotyping or equity. This paper gives guidelines to creators of web pages.

The second set of papers bridge the gap of cultures through an international flavor. The paper by Carey from the University of British Columbia, Canada focuses on investigating and comparing how 12 students (5 ESL and 7 native speakers of English) negotiate meaning in an on-line bulletin board or face to face mode of communication environment. The author studied the interaction of how students from diverse backgrounds were influenced by and negotiated meaning of inadequate academic content schema. The use of the virtual seminar and how it facilitated the second language acquisition process led to a gradual increase of participation in course seminars. The final paper by Biazus from the Universidade de Caxias do Sul of Brazil focuses on using art education in a digital environment. The main purpose of the study was to verify how and whether the digital environment can provide a practice that is effective for students. This process invites a challenge that is clearly a new way of entering the millennium. Bridging the gap through electronics promotes a quality education for all.

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"At-Risk" Learners and the "Digital Divide": Exploring the Equity in Access Issue

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Abstract: Education has been considered the "key to success," and technology, in recent history, has been considered "the great leveler"—capable of providing "keys" to all learners without regard to their race, ethnicity, or gender. Most recently, the term "digital divide" has surfaced, referring to inequitable access to technology. Within this divide, the "haves" are more likely to enjoy greater access to technology than the "have nots." The long-term negative effects of this phenomenon are being felt by those in certain segments of society who are effectively marginalized by a lack of equitable access to technology. This paper focuses on at-risk learners by examining the factors that contribute to the "digital divide," the possible long-term effects of this phenomenon, and effective classroom uses of technology that challenge the negative impact of the "digital divide."

Introduction

While technology is assuming an increasingly important role in our society, the "digital divide" between the "haves" and "have-nots" is widening at an alarming pace. Sculley (1997) describes this era as "an opportunity that is given only to few generations in history . . . if we respond with our best creative energies, we can unleash a new Renaissance of discovery and learning" (p. 142). In order for all members of society to assume full membership, however, it is imperative for them to have equitable access to the emerging technologies that will fuel this "new Renaissance."

The term "digital divide" has been applied to a phenomenon wherein the "significant growth in computer ownership and usage overall . . . has occurred to a greater extent within some income levels, demographic groups, and geographic areas, than in others" (McConnaughey & Lader, 1995, p. 2). Historically, the U. S. telecommunications policy's goal has been to provide affordable access to telephone service to all Americans; however, McConnaughey and Lader contend that "while a standard telephone line can be an individual's pathway to the riches of the Information Age, a personal computer and modem are rapidly becoming the keys to the vault" (p. 2). Consequently, the "digital divide" has become a national concern. Those who do not have access to state-of-the-art technology are marginalized in a society that increasingly relies on electronic literacy to navigate everyday existence. Not surprisingly, the effects of inequitable access are being felt in our schools as well as in the larger society.

In reviewing research literature, six themes emerged. Four of these themes emerged as contributing factors in the inequity of access referred to as the "digital divide." Two additional themes emerged related to probable consequences of and possible solutions to the "digital divide."

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Factors Contributing to Inequity

Quality of State-of-the-Art Technology

A large segment of the American society is marginalized, or unable to assume full membership, because technology is not as readily available to them as it is to other segments of society (Lichtman, 1998). Neuman (1990) adds light to this phenomenon saying "it has become a truism that wealthy school districts [which have fewer at-risk students] own more computers than impoverished ones and that they augment their numbers so rapidly that the gap between rich and poor schools is widening rather than shrinking" (p. 158). Trotter (1996) further dissects the problem positing that although schools have, in general, lowered their ratios, "27% of school computers are . . . all-but-obsolete models" (p. A17).

According to Coley, Cradler, and Engel (1997), "the ratio of students to computers goes up as the percentage of Title I students increases" (p.12). The relevance of this observation to at-risk learners is explained in Cunningham's and Allington's (1994) assertion that "socioeconomic status is highly correlated with academic success" (p. 1). Thus, children who are served by Title I resources are often characterized as "at risk for school failure" and are the students with less favorable student to computer ratios.

Differences in student to computer ratios show that access to emerging technologies in schools has changed over time. Coley et al. state that, historically, Title I funds have been used to provide technology resources, and in the past, Title I schools were more likely to have more favorable student to computer ratios than non-Title I schools. More recent figures, however, suggest that Title I resources are no longer able to maintain a state-of-the-art status (Coley et al.). Often Title I schools that were able to build technology resources continue to show favorable student to computer ratios only because much of the available hardware is *the obsolete equipment which, when originally purchased with Title I funds, was state-of-the-art*. This explains the Coley et al. 1997 overall figures for student-to-computer ratios that show only a slight difference between high-spending districts (9.7 to one) and low-spending districts (10.6 to one). When these figures are disaggregated, however, figures for *state-of-the-art* computers, in Title I and non-Title I schools illustrate a vastly different comparison. According to 1997 figures, "schools where less than 20% of the students qualify for Title I have a ratio of about 22 students per [multimedia] computer, compared to a ratio of about 32 students per computer in schools where 81% or more of the students are eligible for Title I" (Coley, et al., p. 15). These figures illustrate that children in schools with higher numbers of at-risk students must share their state-of-the-art computers with more students. Thus, there is a much greater gap in access for state-of-the art computers than for computers in general.

Inadequate Quality of Technology Use

Compounding the problem of inadequate *quantity* of state-of-the-art technologies for at-risk students is the problem of inadequate *quality* of use. While the "haves" often use technology in ways that promote higher order thinking skills, the "have-nots" are more likely to be involved in activities that employ the lower order thinking skills (McAdoo, 1994). Possible activities that promote higher order thinking skills are projects that require access to

the Internet as a resource for research topics. The information students have analyzed and synthesized may subsequently be shared with presentation software. Additionally, the "haves" who are involved in these activities may attend schools that "are more likely to use computers to teach higher order literacy and cognitive skills through the use of programming languages and sophisticated graphics and simulation tools for mathematics and science instruction" (Emihovich, 1992, p. 501).

Conversely, the "have-nots" may be more likely to employ lower order thinking skills utilized in programmed learning, (i.e., computer-generated drill and practice activities with a limited focus). At-risk students often use computers to promote the development of specialized skills, and in the process, they are placed in a passive role with the computer controlling the environment. Using instructional technology to address skills is "often called computer-based instruction (CBI) or computer-assisted instruction (CAI)" (Grabe & Grabe, 1998, p. 82). Grabe and Grabe divide CAI or CBI into the following categories: tutorials, simulations, drill and practice, educational games, and exploratory environments. They report this type of instruction is moderately effective, providing "positive--but incomplete--experiences . . . [and they suggest] that guiding the student, especially in ways necessary to develop complex mental skills, is frequently beyond the capabilities of present applications of technology" (p. 111). Furthermore, Clements (1994) maintains that "the most promising uses of computers have nothing to do with programmed learning" (p. 33). He suggests programmed learning be replaced to a large degree with authentic purposes for integrated computer use that include word processing and publishing, computer simulated mathematical manipulatives, programming, computer painting tools, and problem-solving computer activities. These authentic uses of technology sharply contrast the programmed learning at-risk students often encounter.

Inadequate Teacher Preparation

The third factor that contributes to the "digital divide" is how teachers use technology in their classrooms. Technology in and of itself is not a cure; its efficacy is determined by how it is integrated into the curriculum (Clements, 1994; Fabry & Higgs, 1997; Kongshem, 1996; Laffey & Musser, 1998; McAdoo, 1994). While the availability of ample, high-quality technology opportunities is crucial, teachers' attitudes about and abilities with technology also greatly affect students' equitable access to these tools. According to Fabry and Higgs (1997), only 16% of all teachers are willing to try new ideas and are successful users of technology. This might be attributed to a lack of time to develop skills and confidence in abilities, limited spending allocated to training, and a scarcity of technical support personnel.

Teachers' fears, inadequate training, and lack of support are compounded by teachers' perceptions of technology's impact in the classroom. Laffey's and Musser's research subjects voiced these beliefs: "computers . . . [have] a higher value . . . in the future work environment than in the future school environment . . . [and they] will interfere with the teacher-student relationship" (p. 236). Cunningham and Allington (1994) described an added dimension to these concerns. They maintained that in schools with large at-risk populations, "teachers are instructed to 'teach the basics.' The basics usually referred to are the three r's--reading, 'riting, and 'rithmetic" (p. 181). Thus, basic skills become "the real work" and children are exposed to technology only in a skills practice environment or after "the real work" is complete. Additionally, the difference in the types of technology that different

groups of students are exposed to is often decided by educators who assume that "children must demonstrate competency in lower level skills before they are ready to progress to more complex cognitive skills" (Emihovich, p. 501). Emihovich refutes this notion, concluding from her studies of children who scored low on standardized tests, a determining factor for at-risk status, that their low scores did not preclude them from learning high-level computer concepts.

Adequate teacher preparation is an essential catalyst of any effort to close the "digital divide." In addition to providing teachers with instruction in how to integrate technology in the classroom, with technological support, and with the time to develop these skills, teacher preparation must also address attitudes about technology's place in the classroom. A goal is to replace the perception of technology as an "add on" for students who have mastered basic skills with a perception of technology as a basic skill. Thus, educators meet the needs of their at-risk students by exposing *all* learners to the kinds of technology experiences that will offer a greater chance for success in our technological society.

Inadequate Exposure to Technologically Proficient Role Models

Although at-risk students' exposure to rich technology experiences in school greatly affects their level of electronic literacy, the home environment also plays an important role. Often, at-risk students reside in technologically poor households with less exposure to technologically proficient role models (Lichtman, 1998). According to Lazarus and Lipper (1994), parents in more affluent homes are supplementing their children's technology education. They report that "whereas 48% of households with children whose family income is $50,000 or more have a child using a personal computer, only 7% of households with family income under $20,000 do" (p. 10). Consequently, in many cases the children who are at-risk and experiencing inequitable access to technology in school are the same children who are least likely to have access outside school.

Access to computers in the home is but one component of the role of the home environment. Lichtman (1998) reports that the parents of at-risk students often lack experience with computers. This may make them reluctant to encourage their children to pursue technology because they are unfamiliar with emerging technologies and possibly apprehensive about potential negative effects of technology on their children's lives. This perspective is in sharp contrast to that in homes where "as family members become techno-literate at home and at work, they are coming to regard computers as an important tool for education" (Trotter, p. A17). Consequently, at-risk children who are often technologically underserved in the schools also have fewer opportunities to encounter technologically literate role models outside the school environment.

Effects of Inequitable Access

The effects of inequitable access to technology can be felt socially, politically, and financially. Inequitable access marginalizes segments of society and creates an "information underclass" of people who are "digitally dispossessed" (Topping, 1997, p. 11). Lichtman (1998) contends that considering "the increasing importance of the Internet in political and social discussions . . . the disadvantage of the disconnected becomes a critical problem for our society as a whole" (p. 47). Menchaca (1997) further details the phenomenon taking the position that future social and economic viability hinge on access to technology and its role in access to learning and power. Furthermore, Lazarus and Lipper (1994) assert the premise that "as businesses lean more heavily on telecommunications and electronic technology, American workers must increasingly learn the ways of electronic communications just to carry out their day-to-day responsibilities" (p. 7).

The long-range potential ramifications for students with underdeveloped electronic literacy skills are daunting. As these students mature and enter the adult world of employment, they will find that employers increasingly expect workers to be able to navigate technology and use it effectively, and the rewards for possessing these abilities will be manifested in better-paying jobs (Lazarus & Lipper, 1994; Lichtman, 1998; Trotter, 1996).

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Electronic literacy is becoming more important to employers as jobs increasingly demand "both basic literacy . . . at a relatively advanced level, and information technology skills" (Lazarus and Lipper, 1994, p. 7). The consequences for those who are unprepared to respond to the demands for proficiency with the new technologies are felt in less attractive employment positions. Recent figures show that two thirds of college graduates use computers at work compared to fewer than one tenth of high school dropouts, and in 1992, a college graduate earned 83% more than a high school graduate (p. 8). Thus, research literature highlights the "digital divide's" potential for long-range detrimental effects on financial viability.

Effective Uses of Technology

The use of technology as a scaffold "that is specifically engineered to assist learners in performing tasks for which they would otherwise be unprepared" can lessen the impact of the "digital divide" (Laffey, Tupper, Musser, & Wedman, 1998, p. 75). Kongshem (1996) describes effective scaffolding where computers are used "much like carpenters use hammers--as tools to construct authentic, personal, and meaningful projects" (p. A21). This quality of computer use is in sharp contrast to drill and practice programs with repetitive practice of basic skills intended to increase fluency.

Effectively integrating technology in the classroom requires a foundation comprised of state-of-the-art technological tools and an environment conducive to integrating these tools seamlessly across the curriculum. In this type of environment, "computers are active agents, extending the users' abilities, enabling them to create new problems and to devise new solutions. When used actively, the tools help the user to accomplish personal goals and objectives" (Bowman & Beyer, 1994, p. 22).

The nature of the environment most conducive to effective integration is one that includes the changing roles of teachers and students and provides effective scaffolding. Such an environment integrates technology across the curriculum and implements it as a tool to facilitate connectivity, integration, and productivity. The traditional direct instruction model, sometimes referred to as "chalk and talk," has been widely accepted as effective for delivering predetermined content. Such a construct does not effectively prepare students for a technology-rich society that requires a great deal of synergy and non-linear productivity. Today's classrooms are evolving to reflect the following modern model offered by Tapscott (1999) by realizing shifts in thinking about teaching and learning from

- linear to hypermedia learning;
- instruction to construction and discovery;
- teacher-centered to learner-centered education;
- absorbing material to learning how to navigate and how to learn;
- school to lifelong learning;
- one-size-fits-all to customized learning;
- learning as torture to learning as fun; and
- the teacher as transmitter to the teacher as facilitator.

A model such as Tapscott's recognizes our society's evolution from the Industrial Age to the Information Age.

Conclusions

Education has long been considered the "key to success;" however, in order for education to truly unlock the door to a successful future, educators must address equitable access to high-quality technological experiences. When they are designed for all learners, these experiences prepare them to be contributing, successful members of the "New Renaissance." Effective professional development can raise teachers' comfort level with technology and afford more opportunities to integrate technology in the classroom, but in order to

positively impact the "digital divide" and realize equitable access for at-risk students, teachers must also understand the importance of electronic literacy for all students (Coley et al., 1997; Fabry & Higgs, 1997, Kongshem, 1996; McAdoo, 1994; Neuman, 1990). At-risk children who are limited to using remedial and drill software in order to acquire basic skills are kept from the kinds of technology exposure that will offer their best chances for success in our technological society. The "programmed learning" format places the user in a passive role, yet all children, including at-risk children, need to "become aware that they control the technology and it does not control them" (Emihovich, p. 502).

In order to remedy this situation for at-risk students, the focus for administrators and educators should be on professional development opportunities for teachers with a goal of seamlessly integrating technology as a tool. This integration would be for the benefit of all students, bringing at-risk students into a common arena and challenging the "digital divide."

An integral element of professional development includes a commitment in terms of exploration time and technical support. This commitment would allow teachers opportunities to build the skills and confidence necessary for weaving technology into the very fiber of the classroom. In this way, classroom technology becomes a transparent tool, and teachers and students use technology to support learning and express new knowledge. Thus, teacher preparation and common goals for implementation will have contributed to equitable access and opportunities for all learners to reach their highest potential as contributing members in the society of the information age.

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Integrating Standards-Based Instructional Technology

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Abstract: The Navajo Education Technology Consortium/Education Technology Improvement Plan (NETC-ETIP) project is just entering it's second funding year. This unprecedented project involves 13 school districts in three states (Arizona, New Mexico, and Utah), two Universities (University of New Mexico and Northern Arizona University), two community colleges (San Juan College and Dine College), two departments of education (Arizona and New Mexico) and the National Indian Telecommunications Institute (NITI). The project serves 2,749 teachers in 13 isolated, poor, rural school districts across the 25,000 square mile Navajo Indian Reservation. It is a technology training and integration project funded by a grant from the United States Department of Education under their Technology Innovation Challenge Grant Program. This paper includes a general project overview, a synopsis of year one objectives and accomplishments, and a detailed analysis of the year one Arizona training sessions including results and outcomes.

Project Overview

The project uses a 'training of trainers' model. Each school has designated a training team consisting of one administrator, two teachers, and one parent. Training teams receive instruction in technology and technology integration in one of four regional training centers (Window Rock, Arizona; Kayenta, Arizona; Gallup, New Mexico; or Shiprock, New Mexico). The two Universities (University of New Mexico, UNM and Northern Arizona University, NAU) staff and operate the training centers in their respective states in partnership with the host school district. The training focuses on providing teachers the knowledge and skills needed to create standards based, culturally relevant, technology based curriculum.

The project uses a scaffolding approach to training curriculum. Each school team returns to the regional training center annually to build on what they learned and implemented the prior year. Upon training completion, teams return to their respective schools and instruct all remaining teachers. Each teacher team member is asked to develop at least two standards-based, culturally-relevant, technology-based curriculum modules for use in the classroom. Additional modules are being developed by other teachers. A newly awarded STAR schools grant will take selected curriculum modules (approximately 100 each year) and further enhance and develop them into professional products. These revised modules will then be distributed via NETrain, an interactive, on-line, instructional technology training web page. In addition they will be available for distribution via CD-ROM.

An important feature of the NETC-ETIP project is year-round, on-site technical support for the training teams. Each center site employs a full-time training coordinator. This coordinator (a University employee) facilitates training sessions held each summer (with an exception in year one which had one training sessions in the winter and one in the summer). In addition, the coordinator also provides continuous technical support to the training teams throughout the school year as they train teachers at their schools and integrate the training into their classrooms. Site coordinator support has included additional training, hardware and software assistance, providing additional resources, assisting with the school-based trainings, presentations to stakeholder groups, and more.

The training curriculum is referred to as the Integrated Technology Training Curriculum (ITTC) and is developed by each University with local district input. Overall, the project director provides guidance to insure training uniformity at all four training centers, but actual training session content is flexible through site-based management and local superintendent input, in order to fit each district's long-range technology plans. The ITTC is competency based and incorporates a full range of concepts and skills integral to successful use of technology in the classroom, based upon the International Society for Technology in Education (ISTE) Foundation Standards. Moreover, the ITTC also includes instruction on the integration of state academic

standards, alternative classroom teaching strategies (including constructivism), alternative and embedded assessment techniques, and creating culturally relevant curriculum.

Year One Objectives and Accomplishments

This project had very aggressive objectives for the first year. They included:

1. Recruit and hire a Project Director, University project directors and training center coordinators,
2. Set-up technology training centers, organize the training teams and schedule them for training,
3. Plan and formalize the ITTC training curriculum content (Level I); conduct pre-training workshops with all trainers; and conduct all ITTC Level I training activities (five days each team in the winter),
4. Plan and set-up NETrain designed for on-line training, classroom resources, help desk, and electronic discussion groups,
5. Provide support to individual schools for conducting teacher training at their schools,
6. Plan and formalize the ITTC training curriculum content (Level II); schedule summer training sessions; conduct pre-training sessions with all trainers; and conduct all ITTC Level II training activities (eight days each team in the summer),
7. Project evaluation conducted by project staff, project management committee, evaluation oversight committee, and external evaluator throughout first project year (and subsequent years),
8. Faculty advisory councils created and maintained by each University for articulation and implementation of training curriculum into the teacher preparation programs.

Even though the first year had very aggressive goals and the project was funded late (notification not received until early October with an October 1 start date) all project objectives were met during the first year. During the winter of 1998-1999 (year one), each teacher team received five days of instruction (in one of the four newly created training centers). Teams returned to their schools and provided training to other teachers during spring 1999 (some more thoroughly than others). In addition, some team members created curriculum modules (primarily PowerPoint presentations with some web pages). However, each teacher team member did not produce two modules each as originally planned. Technical assistance and support was provided on-site to the training teams during the spring semester.

During the summer of 1999 (still the first year of the project), teams returned to their training center site to receive the next level of training. Eight days of training were provided to each team. Teams then returned to their schools and most began providing training to other teachers in August and September. Additional training is expected to occur throughout the 1999/2000 school year. In Arizona, each team created a student-centered, problem-oriented curriculum module based upon the Norton model presented in training during the summer session. Each teacher is expected to create at least one more additional module during the school year using the same (or similar) student-centered, problem-oriented approach. An aggressive on-site technical assistance and support campaign was launched in September and continues today.

Analysis of Year One Arizona Training

Winter 1998/1999 (Level I IITC)

The winter training was composed of five days of training delivered from December, 1998 – May, 1999. Sessions were conducted at both training center sites. Day one was conducted during four sessions in December. Days two through four of the training were completed with each team by early February. The fifth day was completed on-site at each school during the school year. This approach was used to minimize classroom absence for teachers. Comparatively, New Mexico took a different approach and held training over five consecutive days starting in late January and concluding in March.

Of the nine school districts and 39 schools, full participation would have been 156 team members. Some schools sent more than two teachers or more than one administrator and overall 159 team members attended at least part of the winter training sessions (88 teachers, 37 administrators, and 34 parents). Only four schools did not have an administrator attend any of the winter training. All schools had at least partial representation at the winter training sessions.

Day one was entitled "The Forest" and was designed to give the team members the big picture or an overall view of the five-year project and the types of curriculum (culturally relevant, standards based technology modules) that will be produced over the length of the project. A project overview, cultural overview, introduction to standards, and a hands-on session previewing culturally relevant technology curriculum (PowerPoint and Web based) was presented.

Day two focused on "Basic Technology Skills." This day started with a discussion of change using the Joel Barker video "The business of Paradigms." A majority of the day consisted of hands-on sessions including Internet navigation and accessing appropriate Internet resources (including search engines); basic word processing including incorporating pictures and text from the Internet; and an introduction to Excel spreadsheets and graphing using a popular classroom math lesson.

Day three was divided into two topics 1) Integrating standards based curriculum, and 2) Peer coaching strategies. Teachers analyzed their progress towards integrating standards, aligned a curriculum with standards, and created a thematic unit with the assistance of technology that was cross-referenced to the standards. They also learned about constructivist teaching techniques and taught a mini-lesson to their peers.

Day four was entitled "Integration and Application." Each team learned PowerPoint while developing/creating a PowerPoint based curriculum module based upon the thematic unit they created in Day 3.

Day five was conducted on-site back in the team's district and school. Joel Barkers "Visions" was used as an introduction to "Building the Team and Creating a Plan." Each team developed a vision and action plan for implementing the spring teacher training within their schools. In addition, communicating on-line, including how to use the project created email discussion list, was covered on-site at each school

All sessions were evaluated by Northern Arizona University using a five-point scale. From day 2two forward a standard evaluation form was used for all sessions. The five-point scale used is shown in (Tab. 1).

5 – Excellent	4 – Exceeded my expectation	3 – Met my expectation	2 – Fair, below my expectation	1 – Poor

Table 1 – Evaluation Scale

Day one used a different form for evaluation. Four areas of training were evaluated (grant overview, cultural overview, standards overview, and the technology module presentation). The overall average for day one is included in the data table (Tab. 2) for comparison purposes. Day five was not evaluated consistently in each session and therefore is not included in the data table.

	Day 1	Day 2	Day 3	Day 4
Timeliness of topic		4.1	4.1	4.6
Value of information		4.3	4.2	4.8
Appropriateness of content/organization		4.2	4.1	4.7
Knowledge/expertise of presenter(s)		4.4	4.4	4.7
Effectiveness of communication style used by presenter		4.2	4.2	4.6
Involvement of participants		4.3	4.0	4.7
Value of time spent in workshop		4.3	4.0	4.7
Usefulness of materials		4.2	4.1	4.7
Overall Average	3.7	4.3	4.1	4.7
Total Sessions Conducted	4	9	6	9

Table 2 – Evaluation Results for Winter Training (Arizona), conducted by NAU

As you can see from the data table (Tab. 2), each day except for day one exceeded the expectations of participants. Day five approached "excellent." The days that were mainly focused on hands-on activities (days two and four) were evaluated much higher by the participants, especially day four which was the "integration and application" activity of creating a PowerPoint module. An independent evaluation by SouthWest Laboratories (random sampling of 11 school team members were contacted for a phone interview) corroborated the above data finding the PowerPoint session rated as "The best for you." Why asked why those interviewed responded because it was "practical and operational."

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Summer 1999 (Level II IITC)

The summer training consisted of eight days of training delivered from May to September. The first seven days were delivered in the summer at the two training centers; the eighth day was a combined day for all Arizona participants in September. A variety of formats were offered to accommodate the participants during the summer: seven consecutive days, four consecutive days followed by three consecutive days, and three consecutive days followed by four consecutive days. In order to accommodate summer schedules for the teachers (including attending summer school, teaching summer school, vacations, and more) teachers were even allowed to crossover between center sites if space allowed.

Of the nine school districts and 38 schools (one school in Utah dropped out of the project prior to the summer training), full participation would have been 152 team members. Eighty-seven percent of the team members attended at least part of the summer training sessions: 75 teachers, 22 administrators, and 35 parents. It is very important to say that 15 schools (39%) did not have an administrator attend any of the summer training. One school was a 'no-show" and had no representation during the summer training sessions.

Summer training consisted of the following topics:

1. Introduction to the Pricilla Norton Model (1/2 day). This model is a published student-centered, problem oriented approach to integrating technology in the classroom. It includes classroom environment, activities, assessment, and the learning process. Constructivism is the student-centered approach included in the model. (Norton, P., & Wiburg, K. (1998). *Teaching with Technology*. Orlando, FL: Harcourt Brace College Publishers.)
2. Web Page Development using Communicator (1 ½ days). NITI provided web page design training using a Corn Activity. Teams then developed their own web page and created a lesson on the web.
3. Zerkonian Activity (1 day). Teams worked together on a lesson that integrates standards, technology and culturally relevant material and modeled the student-centered/problem-based approach. Teams were required to work in groups to create a trip prospectus for aliens visiting the Navajo Nation. The activity required teams to organize, plan, research information on the Internet, do cost analysis using Excel, do a trip itinerary using Word, and develop a PowerPoint presentation to present to peers.
4. Embedded Assessment (1 day). Northern Arizona Literacy Enterprise or G2 Consultants spent a day on the Arizona State Standards and embedded assessment strategies.
5. Dine (1/2 day). In this session (presented only during two training sessions/40 participants) Dine Community College presented PowerPoint presentations on Geology and the Navajo learning philosophy.
6. CD/Access (1/2 day). A lesson was delivered on the use of educational CD-ROMs in the classroom including how to find and evaluate products for classroom use. Samples of different educational CD-ROMs were provided for team members to try. An introduction to Access (a database), using step-by-step lessons from the Microsoft web page, was also provided.
7. Teamwork/Presentation (varied 2 days – 2 ½ days). Each team was given time to develop an integrated lesson using the Norton Model as a guide. The lesson had to be a student-centered, problem-oriented, culturally relevant, and included embedded assessment for the measurement of content standard achievement. During the last day of the trainings, teams presented their lesson to their peers.
8. Dr. James Knight speaking on "Excellence and Equity in the Classroom" – a presentation that provides teachers with ten things they can do in their classroom to promote student excellence for all students.

All summer sessions were evaluated by Northern Arizona University (NAU) using the five-point scale (Tab. 1) and the standard evaluation instrument for all topics except topic five. Topic five was evaluated using a form provided by the presenters. Three questions were asked: (1) How interesting was the session to you? (2) How understandable was the session to you? (3) How useful was the session? A standard five-point Likert-scale was used with 5 being high and 1 being low. The overall average for topic five is included in the data table (Tab. 3b) for comparison purposes.

As the data tables indicate (Tabs. 3a and 3b) all summer training topics except for the Dine Culture (which used a different evaluation scale) exceeded the expectations of the team members. Of particular note topic two (web page creation), topic four (integration of standards/embedded assessment), and topic eight (Dr. Knight's presentation on Equity and Excellence in the Classroom) approached "Excellent." A significant difference in overall evaluation averages existed between the two center sites (in most cases at least .5 difference). As different presenters were used for the same topic, this may account for some of the variation. Buy-in levels also differed between schools in the two center sites. The site with lower buy-in had the lower evaluation scores. Southwest Laboratories has not yet conducted an independent evaluation of the summer training conducted in Arizona for comparison and validation.

	Topic 1	Topic 2	Topic 3	Topic 4
Timeliness of topic	3.8	4.6	4.0	4.5
Value of information	4.0	4.6	4.2	4.5
Appropriateness of content/organization	4.0	4.6	4.2	4.5
Knowledge/expertise of presenter(s)	4.2	4.6	4.2	4.8
Effectiveness of communication style used by presenter	4.0	4.6	4.2	4.6
Involvement of participants	3.9	4.6	4.3	4.5
Value of time spent in workshop	4	4.6	4.1	4.4
Usefulness of materials	3.8	4.6	4.1	4.5
Overall Average	4.0	4.6	4.2	4.5
Total Sessions Conducted	9	9	8	9

Table 3a – Evaluation Results for Summer Training (Arizona), conducted by NAU

	Topic 5	Topic 6	Topic 7	Topic 8
Timeliness of topic		4.2	4.1	4.7
Value of information		4.3	4.2	4.7
Appropriateness of content/organization		4.2	4.1	4.6
Knowledge/expertise of presenter(s)		4.2	4.4	4.9
Effectiveness of communication style used by presenter		4.2	4.2	4.8
Involvement of participants		4.3	4.0	N/A
Value of time spent in workshop		4.3	4.0	4.7
Usefulness of materials		4.3	4.1	4.7
Overall Average	3.7	4.2	4.1	4.7
Total Sessions Conducted	2 (n=40)	8	8	1

Table 3b – Evaluation Results for Winter Training (Arizona), conducted by NAU

The evaluation instrument also included collection of qualitative data. Five open-ended questions were asked: (1) Aspects which made attendance worthwhile; (2) Can use the information in the following ways; (3) Suggestions for improvement; (4) Additional training on today's topic needed; (5) Identify future workshop topic/suggested presenter(s); and other comments. The written comments had a few consistent themes across all topics and all sessions:

1. Need more time.
2. Need follow-up training/more training and/or time to practice and use.
3. Can use the information with lesson planning and with students in the fall (or see the potential to with more practice/follow-up assistance).
4. Need more sample lessons developed by other teachers to show during training.

Results and Outcomes of Arizona Training

Skill and Application Growth

A technology questionnaire was delivered to project participants in December during the 'Day 1' training session. During those sessions 85% percent (n=130 of 156) completed the questionnaire. A follow-up questionnaire was administered during the fall with a 17% (n=26 of 152) completion rate. The five-point scale used on the technology questionnaire was:

1=Not at all; 2=Limited; 3=Some; 4=I am comfortable using; 5=I could teach someone else

Table 4 summaries the results of the two technology questionnaires. Prior to training, participants expressed comfort in one area only – "I have used a computer". Many areas were below 3.0 indicating very limited, if any, prior experience. With the limited follow-up sample, growth was seen in all areas. Obvious growth appeared in areas where teachers were trained for new skill/software (PowerPoint, web pages). In addition, significant growth also appeared in areas that have a direct impact on students. Using computers with students started close to "some" but is now approaching "comfortable using." Developing lesson plans that

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integrate technology, standards, and/or Navajo culture components (the main objectives of the project) started in the "limited" range and now all three categories are in the "some" range after only one year of the five-year project.

Question	12/98	11/99	increase
I have used a computer	3.96	4.58	15.7%
I have used a word processing program	4.0	4.58	14.5%
I have used a spreadsheet program	3.07	3.7	20.5%
I have used PowerPoint or another similar presentation program	1.96	3.86	96.9%
I have used Microsoft Office	2.57	3.68	43.2%
I have used the Internet for email	2.95	4.26	44.4%
I have used the Internet to access web pages	3.02	4.14	37.1%
I have used the Internet to search for information	3.12	4.14	32.7%
I have created web pages	1.65	2.98	80.6%
I have used a digital camera	1.97	2.8	42.1%
I have used a scanner	2.01	2.72	35.3%
I have used presentation equipment	1.66	2.78	67.5%
I use computers with students	3.27	3.81	16.5%
My knowledge of the AZ (or UT) state standards	3.21	3.66	14%
I have developed lesson plans that integrate technology	2.39	3.24	35.6%
I have developed lesson plans that integrate the AZ (or UT) state standards	2.5	3.52	40.8%
I have developed lesson plans that integrate Navajo culture components	2.39	3.02	26.4%

Table 4 – Technology Questionnaire (administered to Arizona participants)

Currently, a standardized survey instrument is being developed for both Arizona and New Mexico participants. The instrument will be on-line and both team members and teachers at their schools will be asked to do a self-assessment at least yearly to track growth in skill development, application, and integration into the classroom.

Implementation in School/Classroom

SouthWest Laboratories conducted random sampling phone interview with eleven of the team members from Arizona schools in spring 1999. Results demonstrated that although most teachers were not able to conduct all the training topics at their schools. However, they were making an effect to conduct some training with teachers at their schools, despite some barriers. Team members were asked if they had conducted training at their schools, all but one (91%) responded they had conducted some training. When asked about the response from their colleagues to the training, 45% had a favorable response; 18% indicated busy schedules/more work being an issue for a favorable response, 18% indicated mixed response, and 9% said they 'didn't say much.' (There was one non-response to this question.) When asked what training had not yet been delivered (of the training they themselves had received) and why the answer focused mainly on the Office software packages (Excel, PowerPoint) with the reasons being 45% did not have the software, 18% did not have time, 9% had hardware issue, 9% was still organizing their team. (There were two non-responses to the 'why' question.) They also asked 'of the training you received, what has been implemented in the classrooms'? Thirty-six percent said none, not much, or don't know. The remaining responses included: scanning of pictures, word processing, email; library—look for research, writing letters, word processing; Internet research, digital camera, scanning, PowerPoint; Word, Excel, PowerPoint. The evaluation report indicated: "It is anticipated that as the teachers' technology literacy increases through the scaffolding of training, increased use of technology in the classroom will emerge. The evaluation, at this early time in the project, was focused on documenting the efforts to develop increased technology literacy among school professionals. Later evaluation efforts will focus more on the impact of the training associated with student achievement and the use of technology."

Technology and the Navajo - Its Time Has Come

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Abstract: This paper describes a comprehensive technology project that benefits the Navajo People. The Navajo live in a sparsely populated region of the West that enjoys few of the amenities of larger urban settings. Isolation and remoteness have created a situation where Navajo children have been unable to get an equal education because of lack of access to modern communications and equipment. This paper briefly summarizes aspects of staff development, cultural inclusion, and infrastructure improvements that are attempting to assist this population enter the electronic age.

The Navajo Education Technology Consortium is an organization designed to meet the needs of a group of people who, like many other people living in rural America, have little access to technology. They do not have equal access to a quality education. In many areas, they can not make a telephone call or use any other distance communication.

The Navajo live in a vast land encompassing parts of three states (Arizona, New Mexico, and Utah). The largest geographic school district in the continental United States lies within the reservation, some 5,500 square miles. Many of the roads are unmarked and unpaved. Few telephone companies care to invest in providing service because of the anticipated low return on investment. Lack of running water and electricity is common. Children have died because parents were unable to find anyone with a telephone to call for medical assistance.

In 1998, twelve public school districts in New Mexico, Arizona, and Utah, one private school, and one BIA school joined together to form The Navajo Education Technology Consortium (NETC). That year, this group, which is comprised of the superintendents from each school district, applied for a Technology Challenge Grant from the US Department of Education to train their teachers how to work with technology.

Partnerships were formed with two universities (Northern Arizona University and University of New Mexico), to provide training. In addition, four training sites were set up in different corners of the Navajo Nation and 102 schools sent teams of four people (one principal, two teachers, and one parent) for training. The teams then returned to their schools and began training the rest of their staff in the material covered in training. Microsoft provided a substantial amount of software for the project. The National Indian Telecommunications Institute provides instruction and guidance on cultural components.

During each training session, the teams learn about different types of software and hardware. They then produce lesson modules which address state standards, contain culturally appropriate material, and have some type of embedded assessment. Digital photography, video production, web page design, and investigation techniques for exploration of the Internet for appropriate resources are taught, then used to include material in modules.

The NETC sought, and was funded a second grant that assists the first grant. A STAR Schools Grant was awarded that will establish an Internet data base browser so that all modules can be accessed by teachers within the Navajo Nation (and elsewhere) via the Internet. Four studio sites are also included in the project that will fine tune teacher produced modules by adding computer animation, studio quality sound, and cultural components. Teacher education students within the universities are sought to assist in the "fine tuning" process. Since some schools on the reservation have little or no Internet access, the project is also testing satellite up and down link capabilities in ten school sites. In others, modules will be available on CDs or DVDs. The emphasis is on sharing information that is relevant to the population of students served, The Navajo.

During the first year of the ETIP grant, 102 school teams were given 13 days of instruction. In the Gallup McKinley County School District (the largest of the consortium districts), the superintendent has mandated 3

days of staff development on technology during the 1999/2000 school year. The principal of each school submits to a university trainer an instruction design for the 3 days of training. The university trainer then offers support to the school teams to address the training desired for that school. In this particular school district, all teachers have three years to become proficient in Microsoft Office (or equivalent) and the use of the Internet as a teaching tool.

The impact for teachers coming out of teacher education colleges is profound. By 2002, all students in Gallup McKinley County School District will expect to use technology in their educational experience. New teachers will be expected to be technologically proficient, not only by the district, but most importantly, by the students.

We don't know what the impact on students will be but one device we are developing is an instrument that will try to determine how a Navajo feels about being a Navajo. In the past Navajo students have not seen themselves in texts, the news, or in films. We are attempting to change that. We are embedding familiar pictures, stories, and aspects of the local environment into curriculum. School becomes a place less foreign and less frightening. We expect to see a positive difference in our students, both academically and socially. The Internet and other technologies offer a bridge over isolation. The Navajo are a proud people living in a world apart from many of the conveniences of more urban settings. This project attempts to allow them to participate in a contemporary educational setting with the advantages of the rest of the population while also allowing them to preserve their cultural heritage.

A Multifaceted Approach to Integrating Computers in Multicultural Preservice Teaching

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Abstract. Research indicates that few education faculty consistently model the use and integration of technology in their instruction. At the same time, few in-service teachers feel well prepared to integrate technology into classroom instruction. As faculty ponder how to bring educational technology into preservice education, they frequently consider its use as an either-or choice: teach asynchronous on-line courses or teach synchronous courses in a classroom. This paper presents a hybrid approach used in an undergraduate multicultural education course. This approach more closely mirrors the reality found in most classrooms.

Introduction

Technology has become a pervasive element in higher education and it plays an increasing role in course design, delivery and content across all academic fields. For example, the 1998 National Survey of Information Technology in Higher Education found that 33.1 percent of all college classes use Internet resources and 22.5 percent of college courses use the WWW for class materials and resources (Campus Computing Project, 1998). Data gathered jointly by the American Association of Colleges for Teacher Education and the National Council for Accreditation of Teacher Education in1996 (Persichitte, Tharp, & Caffarella, 1997) show similar trends in schools, colleges and departments of education (SCDEs). Faculty at 45% of the responding SCDEs regularly use computers, televisions and VCRs as part of instruction. Similarly, 40% of the SCDEs reported requiring students to design and deliver instruction incorporating various technologies.

Nevertheless, a 1995 report from the Office of Technology Assessment (OTA) indicated that "technology is not central to the teacher preparation experience" and that educational technology instruction most often "is teaching about technology…not teaching with technology" (p.165). Further, the OTA (1995) found that faculty do not model the technology. In part, this lack of integration may be the result of faculty's perception of technology as a means to enhance teaching, rather than to change teaching (Perisot, 1997). Yet in 1996 the National Commission on Teaching & America's Future challenged schools of education to model how to teach in multicultural contexts and how to use technology in doing so. Notwithstanding, research indicates that few education faculty consistently model the use and integration of technology in their instruction (Lewallen, 1998; Chisholm, Carey and Hernandez, 1998). Indeed, many faculty continue to rely on the blackboard, overheads and, occasionally, slides and videos (Sammons, 1994). Others remain uncertain of technology's appropriate use and educational value and benefits. It is not surprising then, that the National Center for Education Statistics (NCES) in 1999 found that few teachers (20%) report feeling well prepared to integrate technology into classroom instruction.

Within the next decade, some 2 million new teachers will be hired (NCATE, 1997). If these future teachers are to integrate technology into their teaching, they must first feel competent and knowledgeable about its use and instructional integration. Yet students from traditionally underrepresented groups enrolling in teacher education often lack the personal and professional experiences with computers and interactive technology. These students need equitable access to that technology. However, access to technology is not simply a matter of availability of hardware and software; technology access also means opportunities to use varied applications, to develop technological competence, and to experience their use for authentic purposes. Given the number of nontraditional college students

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with families and the many who work to support themselves while attending school, technology access is determined also by time. Teacher preparation programs need to find ways to not only provide the access, but also to model its educational applications.

Because teachers are central to the equitable and effective use of technology in our increasingly diverse classrooms, it is imperative that colleges of education not only graduate technologically competent teachers, but teachers who can skillfully integrate technology in culturally diverse classrooms. In preparing future teachers, we must remember that "today's teacher candidates will teach tomorrow as they are taught today" (NCATE, 1997, p. 4). Our preservice teachers will replicate in their own teaching what they observe teacher educators and classroom teachers doing.

Integrating Technology

Historically, colleges of education have endeavored to meet the technological challenge by *adding* a technology course to the teacher preparation curriculum. Typically such technology courses are taught by an expert technology faculty member in a specially equipped classroom or lab setting. Preservice teachers have acquired their computer competency in a manner that is disconnected from other education courses. This additive, nonintegrative approach has taught future teachers how to operate a personal computer, use specific software and, often, how to assess the educational value of software programs. Unfortunately, it has not taught them how to integrate technology into their teaching.

As more teacher educators become convinced of the need to integrate technology in preservice education, one common misconceptions continues to serve as a deterrent. Educational technology is frequently seen as an either-or proposition: teach asynchronous on-line courses or teach synchronous courses in a classroom. However, alternative and hybrid modes of instructional delivery are also possible and effective. Indeed, modeling technology integration for preservice teacher requires a hybrid approach that more closely mirrors the classroom reality found in most schools where technology and the WWW are used as one portion of learning activities, not as a total system of instructional delivery. Moreover, as we move into new ways of teaching, we must build on what the past has taught us about effective teaching practices and integrate these practices with our new resources.

Underlying Theoretical Principles

In developing this hybrid approach for preservice teacher education, the author applied an eclectic approach based on several theoretical constructs. The basic underlying principles stem from theories of experiential learning, constructivism, and social learning theory (see Kearsley, 1999 for summaries of these theories).

Experiential Learning

According to experiential learning theory, minimizing external threats maximizes assimilation of learning that is threatening to the self. The teacher's role here is to create a positive environment for learning. Since multicultural education by its nature evokes emotional responses, this principle served as a cornerstone for an undergraduate multicultural education courses taught by the author. From the beginning, the instructor conveyed and modeled the concept that a multicultural learning environment is one in which diversity is appreciated and differences are respected, including differences of opinion. In fact, evaluation of students' chat room dialogue was weighted for respect for different opinions.

Experiential learning theory also holds that learning occurs when the subject matter is relevant to the learner's interests, the learner actively participates in the learning process, and the student has control over its nature and direction (Kearsley, 1999). The instructor's role is to balance intellectual and emotional components of learning. The teacher shares feelings and thoughts with the learners, but avoids dominating or imposing ideas. One way to create relevancy and to give students control over their learning is by offering choices within a framework. Consequently, individual students selected readings based on their particular interest from lists of links centered on course topics. Students then actively participated in classroom dialogue and on-line discussions.

In addition, experiential learning sees the role of the teacher as a facilitator who organizes and makes available learning resources. In developing the course, the author created 28 web pages based on the major course themes:

The Nature of Diversity, Personal Identity, Classroom Culture, Teaching in Diverse Classrooms, Teaching Content Areas Multiculturally, and Collaborating with Parents. These web pages provided numerous links to a variety of on-line readings. The richness and currency of on-line multicultural materials led the author to choose this route rather than assign a commercial textbook. In addition, students could use a resource book of multicultural readings as an alternative in case technical problems prevented their accessing the on-line readings. Fortunately, there was only one instance of such problems during the semester.

Constructivism

One of the major concepts of constructivism is that learning is an active process in which learners build on current or past knowledge to construct new ideas or concepts. Learning takes place when students create their own knowledge in an environment where students and instructor engage in active dialogue. Throughout the course students were encouraged to relate their readings and class discussions to personal experiences and classroom observations. Following the constructivist approach, the instructor and students engaged in a lively, Socratic dialogue both in the chat rooms and in class. The instructor responded to all individual chat room postings by first affirming the students' views and then posing additional questions to expand and deepen their critical thinking. For example, when a student commented in the chat room that teachers needed to make all their students feel comfortable and accepted, the instructor responded by agreeing that this was truly important and then inquiring what specifically the student would do to achieve this in her own classroom. On another instance, a student commented that illegal Mexican immigrants are a drain on our economy as they pay no taxes and make use of various economic assistance programs. The instructor responded by indicating that illegal immigrants are indeed a problem in the United States and the asking the student what facts substantiated the claim that illegal immigrants had a negative effect on the economy. In turn the student responded by doing an Internet search on the topic. She then responded that she had found some articles that contradicted her original statement and made her think about how often misconceptions are based on opinions rather than facts.

Social Learning

Bandura's social learning theory emphasizes the importance of observing and modeling behavior. In recent years, Bandura has also focused on the concept of self-efficacy. The author's major goals in creating a technology-supported course were to model the integration of technology for learning and teaching, as well as to develop students' sense of competency in using computers. The instructor also modeled the integration of technology by creating in-class presentation materials as web pages that could be projected on a screen at the front of the room with an overhead projector. Thus students saw how PowerPoint presentations and web pages could be used to present topic outlines, pose discussion questions, and provide examples.

Course Format

A Multifaceted Approach

In teaching a three-credit undergraduate course in multicultural education, the author applied a multifaceted instructional approach that combined both synchronous, face-to-face instruction and asynchronous, on-line learning. The instructor addressed the issue of equitable access by providing two hours of face-to-face in-class discussion and instruction and one hour of on-line course readings and activities. The on-line work could be completed either on campus at a computing center, in the classroom lab where the course was offered, or at home for those with computers and a modem. In addition, the instructor remained in the computer lab during the third hour to provide technology support and one-on-one discussion of topics or assignments.

In creating this course, the author principally used three programs: (a) *CourseInfo*, a licensed course management tool which served as the structural framework and starting point for course work; (b) *FirstClass,* which provided email communication with the instructor and could be accessed through *CourseInfo*; and (c) *Netscape Communicator*, which provided access to the instructor-created web pages and on-line readings. All students received a free email account and free training in the use of *First Class*, the university-supported instructional email program.

At the first class meeting, students enrolled on line into *CourseInfo* and acquired their individual user name and password. Once enrolled, students could access the syllabus, read announcements from the instructor, read about the instructor, see classmates' photos and web pages, link to the instructor's web pages for each course topic and enter

their randomly-assigned chat group. Opening the instructor's web pages in *Netscape*, the students found links to a variety of readings focusing a course topic. These readings ranged from personal opinion pieces to scholarly journal articles and represented a variety of perspectives, such as differences in sexual orientation, special needs, race, ethnicity, language, and religion. The instructor's web pages also provided links to the chat rooms in *CourseInfo* and to *FirstClass* email. In addition, students could reference the instructor's in-class presentation materials that were placed in a lesson folder within *CourseInfo*.

Peer Learning

Collaborative learning was an integral a part of the on-line chat groups and in-class discussions. Students met in class with their chat group, visited the assigned instructor's web page and chose their readings for the following class session. Each member of the chat group chose different on-line readings. These readings were then shared with the other members in the chat room via a summary and reflection on its implications for teaching.

In class, the students read their group's chat room entries and then shared what they had learned from their readings with the entire class. The instructor provided guide questions for class discussion and opportunities for small group work. In addition, chat groups collaborated in developing and presenting multicultural teaching activities for content areas. These collaborative projects included in the evaluation rubric peer evaluation of members' contributions, timely work, degree of collaboration and respect for others' opinions and suggestions.

Limitations and Benefits

Although the author has taught this course over a seven-year period, this was her first comprehensive attempt to integrate technology. The results of this integration proved beneficial for students, but held several challenges and limitations for both the students and the instructor.

Limitations

Time. One of the major limitations to the development of this web-supported, hybrid course was the amount of time required. In addition to the usual time needed for the creation of a syllabus, lesson preparation and development of course materials, this combined format required additional preparation and on-line time commitment. This extra expenditure of time is one that not all institutions support, recognize or reward. Time is a crucial resource in identifying appropriate materials, organizing the on-line resources, creating course web pages and developing *CourseInfo* pages and links.

Rethinking of course delivery, course content and organization occurred during the Spring semester prior to the Fall offering of the course. Reconception and restructuring of course topics led to the new course format. Although the author had identified and bookmarked multicultural on-line resources over a span of several years, she needed to verify the continued existence of these pages and their current URLs. She also had to identify additional on-line resources to expand the available reading choices for students, include new topics, and offer multiple perspectives on every topic. Hence, she spent innumerable hours adding to her list of bookmarks for the course.

The creation of the web pages also required vast amounts of time. During the summer prior to offering the course, the author spent approximately 168 hours in creating the main web pages for the course and an additional 10 hours in setting up the *CourseInfo* pages.

Throughout the semester, the instructor spent an average of 5 hours per week reading chat room entries and responding to each student individually. In addition, the instructor also read and replied to individual students' email messages which averaged about three messages per week.

Computer competency and access. Though nearly 80% of the 24 students enrolled in the course owned a computer, the remaining students had access only on campus or at work. However, some of the students who owned a computer had low-end computers which did not allow them to access the on-line materials from home. Similarly students' self-reported computer competency varied considerably, from a student planning to become a computer design expert to several whose only occasional encounter with a computer was for word processing. One non-traditional student had such a high computer phobia, that she opted to drop after the first class session.

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Accessing on-line materials became an issue for the first two class sessions. Some students enrolled late for the course and had to be registered into *CourseInfo* during the second week of classes. Others forgot their passwords or user names the first few times. These students had to re-register into CourseInfo during the second week of classes.

Of course, the instructor's own computer expertise and competency also comes into play in the development and delivery of a web-supported course. Although the author is comfortable using either a PC or a Mac platform, the majority of her work is done on a PC. Due to scheduling problems, the course was offered in a Mac computer lab and the instructor often had to learn by trial-and-error during the class session how to perform certain tasks on a Mac.

Benefits

Increased computer competency. Though most students had some level of computer competency, the majority had no experience in using chat rooms or using on-line course readings. By the end of the semester, many students commented on their learning how to use a chat room, their increased confidence in using a computer and their altered thinking about how they will use computers in teaching. Those who initially indicated little computer expertise stated that they had greatly improved their computers skills and felt comfortable navigating web pages.

At the same time, the instructor expanded her own computer competency by using *CourseInfo* for the first time and by working in a Mac environment. Her occasional learning of the Mac by trial-and-error in class also served as a way to model life-long learning and the continuous nature of computer competency development.

Student-Teacher Communication. One of the most beneficial outcomes of this multifaceted approach to teaching was increased student-teacher interaction and communication. Students readily emailed the instructor questions and concerns. Four sent their assignments as attachments to their email. All students received comments and questions from the instructor to all their chat room entries. As a result, the students and instructor engaged in some interesting, interactive email and chat room dialogues around multicultural issues. These on-line conversations often transferred into the classroom as students shared with the class what they had been discussing and thinking about in these two-way conversations.

Diversity awareness. The primary purpose of this course is to increase diversity awareness and develop multicultural teaching skills. The first half of the course was devoted to defining terms, identifying the nature of diversity and developing awareness of diversity issues. Students expressed feeling safe enough to voice their opinions. They also found topics relevant to their interests and experiences. For example, one young man indicated that he had had mixed feelings about dealing with gay and lesbian students, but after choosing to read all the on-line readings provided from this perspective, he now had changed his opinion and had a new perspective. Other students made such comments as "this really opened my eyes" and "I hadn't thought about this until we read and discussed it." This increased awareness resulted not from the instructor trying to change opinions, but through students' selection in readings, chat room conversations, in-class discussions of topic questions and the instructor's Socratic probing.

During the second half of the course, students used the on-line readings and resources to develop chat group presentations of multicultural teaching activities for language arts, mathematics, science and social studies. Chat group members planned their activities both on-line and face-to-face in the classroom. They integrated what they had learned about diverse populations, including children with special needs and language differences, and applied their knowledge of multicultural teaching strategies. Their presentations evidenced an awareness of the nature of multicultural education and provided for diverse learners.

Conclusion

The focus of this instructional experiment was to develop diversity awareness and multicultural teaching skills. A secondary purpose was to model technology integration and expand students' computer competency. Both these main goals were successfully achieved. Evidence that the students have come to value their experience is the fact that they requested access to the course pages after the conclusion of the course. Several students indicated that they would like other instructors to use this same approach. The vast majority expressed having learned a great deal,

changing their perspectives and acquiring multicultural teaching skills. The time and effort required both of the instructor and the students was well rewarded.

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"From Tatters to Tapestry": Technology and the Weaving of Cultural Education in the Mainstream Classroom

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Abstract: A basic tenet of multicultural education suggests that the learning, sharing, and integration of culture is necessary for the academic success of both majority and minority students. With the shifting demographics of the population, even small towns and rural areas are facing this challenge of the cultural education of the ESL student and the majority student in the mainstream classroom. However, the instructional use of print media alone is limiting and can inadvertently create reductionist cultural portrayals. With a theoretical grounding in cultural pluralist concepts, this paper suggests ways that teachers can move beyond print media alone, and use technology to develop and implement cultural activities in which both the majority and minority students participate in creating cultural portraits of different cultural groups represented in that classroom. In such cultural activities, technology may be used as a tool for tracing how our students' unique cultural threads weave together the larger, common tapestry of our multicultural classrooms.

Introduction

In the name of national unity, a pervasive notion in the United States has been that cultural and linguistic diversity should be harnessed through an assimilative process, into one culture and into one language. This assimilationist perspective of the teaching of culture has historically affected the education of English as a Second Language (ESL) students in the United States in that their heritage cultures and languages have been, at the very least, absent from the curriculum (Ovando and Collier, 1996). However, a basic tenet of multicultural education affirms that not only is it possible, but also necessary, to affirm heritage cultural and linguistic roots while simultaneously sharing a set of societal principals (Banks and Banks, 1997). Therefore, this basic tenet of multicultural education suggests that the learning, sharing, and integration of culture is necessary for both majority and minority students. The differing views of assimilationism and pluralism form the basis of the reciprocal roles of culture in education, and cultural education. And these differing views form critical foundations upon which teachers, of both majority and minority students, will base their curriculum. Therefore, it is necessary to examine these differing views and the implications for the teaching of culture in the majority, or mainstream classroom. This paper explores the theoretical foundation of this basic tenet of multicultural education. With this theoretical grounding in cultural pluralist concepts, this paper discusses how technology can be used to reveal the cultural tapestry that is our mainstream classroom.

What are the Assimilationist and Pluralist Views of Culture?

The assimilationist view of culture holds that it is necessary for all members of a society to share a set of cultural ideas and ideals in order to achieve "national unity." This national unity is desirable in order to maintain the nation's steadfastness against other, possibly threatening, nations of the world. The assimilationist view of culture has traditionally held high expectations for the schools: The schools have

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been hailed as the purveyors of the mainstream society – the vehicle through which immigrants will learn the one, common culture; the one, common language; the one, common shared set of civic notions and ideals that are necessary to be considered "an American." – "one of us." In this light, the assimilationist view of culture has seen the schools as a unifying mechanism (Dewey 1916; Handlin 1951; Hechinger 1978). Since the idea is that cultural diversity will lead to differing, contrasting, and *opposing* views, the schools have been charged with the task of replacing heritage culture with that of the mainstream culture. What has occurred in the schools can be considered a "deculturalization" of immigrants. In contrast, a basic tenet of multicultural education is the concept of cultural pluralism. This basic tenet affirms that not only is it possible, but also necessary, to affirm heritage cultural and linguistic roots while simultaneously sharing a set of societal principals. In the cultural pluralist view, the differing groups can, and do, maintain unique values and ideals, while strengthening and adding to the mainstream group. Within the cultural pluralist view, schools therefore are, and can be, the instruments for discovering and valuing different cultures.

What May Be the Ramifications of the Assimilationist Perspective upon Majority and Minority Students?

Deculturalization has taken root by portraying the dominant culture in the classroom via texts, activities, teachers, and personnel. Deculturalization, at the least, simply does not include the minority cultures in the curriculum. At its worst, deculturalization has taken root by the inclusion of, but negative portrayal of, minority cultures in the curriculum. The result can be detrimental upon majority and minority group members. The majority student may not see that the minority group is, and probably has been, a constant influence on the majority culture. Instead, the majority student may only see the difference or the "otherness" of the minority student. This separateness and idea of seeming newness may cause the majority population to be perhaps fearful of the perceived economic, cultural, and linguistic impact that the minority group may have in the communities. Negative perceptions and in, extreme cases, hostility and/or violence may ensue.

These concepts also have, of course, negative impact upon minority students. Research indicates that the positive or negative perceptions of the mainstream population toward the minority population can affect the academic performance of language minority students as they internalize the perceptions of the mainstream population towards their minority culture (Ogbu, 1978; Skutnabb-Kangas & Cummins, 1988). Further, research indicates that another impact of cultural stereotyping is the negative influence upon self-esteem. As Ogbu 1992 has argued, lowered self-esteem can negatively affect the "locus of control", or the perceived control that one has over one's environment. Decreased self-esteem as a result of cultural stereotyping may therefore lead to the inability to see the relationship between one's actions and the response of the outer environment to those actions. The idea that "no matter what I do, it doesn't matter – the teacher will still not expect very much from me; the other kids still will not like me; even, my parents will not understand me etc., etc.," can lead to hopelessness, and abandonment of plans. Racial and cultural discrimination, whether it is real or perceived, examined or unexamined, is a reality in culturally pluralistic communities. And this reality of cultural and racial discrimination often *first becomes* a reality for the minority student *in the classroom* (Cummins 1986, Ogbu 1992). Considering the above points from the literature, it is necessary to integrate the teaching of culture in the mainstream classroom, for academic well being of both the majority and the minority students.

Why Should Technology be used in the Integration of Culture into the Mainstream Classroom?

There has been a great deal of literature, both research and theoretical literature, which offers advice on how teachers can integrate culture through print media and through published synopsis *about* the cultural minority group. However, as has been noted by Ovando and Collier (1996), often the necessity to present conclusions about a group can lead itself to a cultural reductionist view of that group – in effect, creating or perpetuating a stereotype. For example, there may be an emphasis and an oversimplification of historical

outlines, cultural traditions, foods, and dress. *This is one of the disadvantages with using print media alone.* This is one of the disadvantages to using, in particular, print media about a group that has been created largely by the dominant group for majority members. In addressing this problem, or we may think of it as a challenge – in addressing this challenge of taking a fresh look, of unburdening oneself of one's own preconceived notions, it is necessary to invite members of that community which we are examining to help construct cultural knowledge that is not static nor merely descriptive. In attempting to move away from prepared, published cultural synopses, we will, by necessity, begin to seek cultural information from our students and from our communities. By viewing our students and our community members as the "cultural experts," we will begin to focus upon the unique culture of our students and our communities, rather than focus upon generic cultural portrayals often presented in published synopsis. It is in this light, in the moving beyond print media alone, that technology can, and must, play a part.

How can Technology be used to Develop Cultural Activities?

First, it is necessary that as teacher educators, we encourage our teachers to expand their notion of technology. It is important that we encourage our teachers to think of technology in terms of mechanisms by which we communicate. As such, "technology" can include: Audio, Video, CD-ROM, WWW, Telephone, e-mail. An occupational hazard shared by many teacher educators is the often-heard sentiment: "But I don't have technology in my classroom, school, district." A lack of readily accessible "technology" is indeed a challenge. Therefore, while encouraging our teachers to expand their notion of "technology," it is important that we encourage teachers to *use the technology that they do have.* This shift in thinking can assist teachers to move beyond the concept of technology as "a computer" and being wistful for what they could accomplish "only if" -- toward thinking about technology as mechanisms by which we are already communicating. By expanding our notion of technology and using what is now accessible to us, we can begin to develop technology-based cultural activities that can, and possibly already do, have a meaningful role in our students' everyday lives. Secondly, it is necessary to consider who will be part of information gathering for cultural projects. Research literature abound with the importance of parental and community involvement for the academic well being of students. Therefore, it is necessary to consider the community members who can, and should, be included. There is no need to think of this as an overwhelming task – one need not try to reassemble the local chamber of commerce for one's classroom activity! Community members of that cultural group usually are present in the school and local community. These are community members with whom the children come into contact with during the normal course of the day: teachers, aides, lunch room attendants, janitors, neighbors, candy store owners, day care providers, those who run the video parlor, or the produce stand, or take tickets at the movie theatre. Of course, we will also add the members of the virtual community – all of them are the threads of the cultural tapestry that we will be tracing. Third, it is necessary to try to focus upon the information that is being gathered about that group. In contrast to the assimilationist perspective of culture, the pluralistic view contends that it is the accumulation of cultural, socioeconomic, and linguistic detail that is the basis for a realistic understanding. Pedagogical innovations using technology must, **and can,** focus upon rooting out such an accumulation.

When developing technology-based cultural activities that "root out" the cultural, socioeconomic and linguistic details of a particular group, one needs to begin with guiding questions that will help our students "dig" and "discover." Consistent with this paper's thesis of multicultural education, the guiding questions of our cultural activities need to open a path toward an understanding of the particular group itself -- by examining the group itself *in contrast with the other group – and also as a part of the other group.* Consistent with this paper's metaphor of the cultural tapestry, the guiding questions of our cultural activities need to open a path toward tracing the individual cultural thread – by examining it as a unique thread with its own color and texture that is unique – and also as a thread which is part of the larger design. Some guiding questions that teachers can use to develop cultural activities are suggested below:

1. How is ethnicity reflected in the immigrant or indigenous status of the group?
2. What is the socioeconomic role that the group plays in the dominant society?
3. How has the group historically influenced the history of the dominant group?
4. To what degree is the group a stable or mobile population?

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5. How has minority status, or acculturation, or both affected the relationship between the younger and older generations?
6. How is wealth distributed in the community?
7. Which community members tend to have higher status in the group, and why?
8. What are the perceived socioeconomic rewards for literacy and school achievement?
9. What are the socioeconomic costs and benefits of membership in the particular group?
10. How is language viewed by the group?

(Ovando & Collier 1996)

These kinds of questions try to illicit information about the group's own concepts of power, economics and social strata. Because these questions prompt the information gatherers to move beyond preconceived notions, such questions can encourage our teachers to design cultural activities that move beyond pre-prepared print media alone. Because such questions prompt information gatherers to seek real-life community informants, such questions can encourage our teachers to design cultural activities that require that students make meaningful use of accessible technology.

How can Technology be Used to Implement Cultural Activities?

Research literature abounds with the idea that certain types of technology can best practice particular language skills. For example, it is well cited that the use of audio can develop listening skills; the use of word processing can develop writing skills, etc. However, often the use of technology coupled with cultural education is scarcely dealt with in the research literature. (Shrum & Glisan 1999) Therefore, it is further critical to remember that cultural activities, *with technology,* encourage the practicing of all the language skills: reading, writing, listening, speaking, presenting, viewing, critical thinking. Using technology in the development of cultural activities discussed here can be part of most of the content area classrooms: social studies, science, math, as well as language arts and ESL. Therefore, using technology in such cultural activities can be helpful for the academic progress of both the majority and the minority student.

When deciding upon the focus of the cultural discovery activity, as guided by the suggested questions above, specific technologies can prompt different means of accumulating cultural knowledge about a particular group, and hence, address the guiding questions. Table 1: Types of Technology-Based Cultural Discovery Activities delineates suggested activities with the appropriate technologies.

Technology	Activities
Audio	Personal Narratives Family Histories Stories from Home Interviews Songs In-person Interviews Telephone Interviews Answering Machine Recordings
Video	Cultural Events: Religious ceremonies, weddings, baptisms Typical Events: Homes, gardens, videos produced in native country, birthdays, dances On-the-Job Videos Neighborhood Scenes "A Day in the Life Of . . ."
E-Mail	Partnering Pen-Pals Partnering with students abroad or college students from native country Grandparent Partnering

WWW	Student Development of Class Web-Page, including personal histories School web-page with discussion corner Web-pages of minority businesses Web-pages of civic groups Home page of U.S. population and demographics with timelines

Table 1: Types of Technology-Based Cultural Discovery Activities

Consistent with the pluralist tenets discussed in this paper, the major purposes of these activities are 1) to involve the students with the community members in a meaningful and realistic way, and 2) to encourage the students to uncover how the minority group is distinct – yet how it is, and has been, and possibly will be, a part of the majority group.

Conclusion

Cultural stereotyping and misunderstanding, whether it is real or perceived, examined or unexamined, is a reality in culturally diverse communities. And this reality often *first becomes* a reality for the minority student *in the classroom* (Cummins 1986, Ogbu 1992). Mere inclusion of cultural portraits in the form of print media and published synopses alone can sometimes fortuitously create or perpetuate stereotypes. However, with accessible technology, teachers can develop meaningful cultural discovery activities that encourage our students to discover and share the various cultures alive in their own classrooms and communities. Technology-based cultural discovery activities can help our students to see that their own unique cultural threads are not tatters – rather, their unique cultural threads, together, weave the larger, common tapestry of our multicultural classrooms.

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Acknowledgements: The author expresses gratitude to Michael Cummins for his comments and support during the preparation of this manuscript.

Gender Representation in Visuals on School Web Pages Course For In-Service Teachers

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Abstract: This paper is based on the findings of a qualitative dissertation that examined K-12 school web sites in a large U.S. school district. The study used semiotic methods to examine web site visuals for evidence of differences in gender representation. Educators who design or oversee school web sites should be aware that visuals published on their pages may have more than one possible interpretation and that the school web site itself influences the viewer. The authority of the school, when published in public domain web pages, can be an impressive credential to the visuals on the school web site and the meanings that those visuals deliver to individual students. Based on semiotics, a concept entitled *cybiotics* explains how the context of visuals are changed on a web site, and a revised model of, What You See Isn't What I See (WYSIWIS), guides review of visuals to avoid gender stereotyping (Maboudian, 1999).

Introduction:

There are an increasing number of school web sites on the Internet. Entering the words: *school web site* can produce approximately nine million hits. Photos of children and animated gifs on the pages of school web sites represent what the school deems appropriate roles and behavior for the children who attend that school. Whether the web site is meant to be a brochure for prospective parents, or is actually accessed by the students, a message is intended by those responsible for authoring the web site. It is important to understand the nature of the web and the identity of the student viewer to fully understand the impact of visuals on gender.

The Power of the School Web Site

The introduction of computer technology in schools has been described in literature as promising students greater equity and opportunity to learn by its inclusiveness of gender (Kaufman, 1998; Wolf, 1998). However, for female students who see photos that sustain gender stereotypes, technology provides a new format for the familiar issue of inequity. There is a diachronic relationship of gender representation on school web sites and stereotypical illustrations in school textbooks (Apple, 1980; Apple, 1993). Just as gender stereotyping in textbooks has been denounced, computer magazines and games have also been criticized in recent literature (Weinstein, 1998). The visuals in school web pages have not received as much attention. Part of the reason may be that some of the photos are selected from what really occurs at school and are used as a journalistic format to illustrate events. Who would object to a photo of elementary school children in a garden project? If the photo shows the boys standing in the foreground with signs, shovels, and plants while the girls are standing in mixed groups behind them, possibly without tools or plants, then the photo may highlight a situation that, while a factual record, is less than equitable. One might say that this was a candid shot of the children. However, this particular photo was posed and, more importantly, the photo was singled out for a web page showcase. Consider the possible meanings that a student viewing the web site might interpret from the photograph. The representation of the event is more than a slice-of-life photo in a newspaper. The photo represents that which is valued by the school as an authority publishing onto the school web site. The web page is sent out beyond the school walls and is available for frequent access, symbolizing acceptable student behavior, not just an event during the past week. The question could be asked of the school web designer whether a different photo should be used.

This introduces the issue of selection and of determining the meaning of what is selected and the impact of the medium of the school web page.

The term *selection* is used because the appearance of visuals goes through a selection process. The arrangement and selection of visuals is an author's choice, limited by stakeholders who have a claim on the decision-making process of the web site appearance. Whether created specifically for the school web page, or selected because they represent an event or student behavior, web site visuals are meant to send a message to a world wide public. The selection of visuals and the authorization to publish them on a district's school web site, a new and highly respected technology, imbues these visuals with authority, as well as the meaning interpreted by the student who views them.

The school yearbook has visuals that represent the students' interactions in the arena of a school, yet it is generated once a year and is in paper format, which students take part in creating and use as a keepsake and autograph book. The textbook, which interjects visuals into the student's educational experience, is from a source external to the school and is not generated electronically at this time. The school newspaper is developed by students with faculty supervision. While it is a school publication, it is a student effort and a learning tool. The technology bringing the visuals to the student through the school web page is an adult enterprise. The selection of the visuals may be made by adults as well. The differences in the nature of the school web site indicate the need for educators to be aware of the impact of visuals through this medium. The visuals in the school web site at this time are often published by faculty or administration to represent the school's approved student activities and behaviors. If boys are in the forefront; if there are more boys represented in computer labs than girls; if the girls are seen chatting in the computer labs while the boys are *working* with the computers; or if the animated gifs depicting computers can be interpreted as male personifications, then the message that the visuals send may not be equitable. The caption might not indicate differences when one reads, *Computer Lab*, but the visuals may.

Cybiotics

An analysis of school web site visuals includes examining the medium itself. The PC monitor becomes a lens through which the individual views the school web site. Meaning derived from a visual is interpreted by the individual. The fact that the visual is seen through a monitor on a web site builds more meaning into the visual. The publishers of the official school web site are state or private institutional authorities. The visual represents the view of the educational authority, or logically, the visual would not be published. The selection of these visuals are, in a sense, academic engineering in that the visuals are brought into a new relationship to one another within the PC monitor. The computer club may be one click away from the home page representing the mission of a school. The sports activities may be represented on the home page itself. The absence or placement of other school activities can make a statement regarding their value.

Cybiotics (Maboudian, 1999) is the concentration of information on the web page of a web site, putting it into a different context of meaning because of the web site design. The familiar photos of students in school activities are concentrated and arranged via navigation and separate pages. They are labeled according to what the visuals represent to the school. The *cybiotic* design of limited numbers of visuals on the web page necessarily leaves some students out, and some activities out. Certain visuals are seen immediately and others are accessed beyond the home page, perhaps after scrolling or clicking through other material that was designed to be accessed or seen first. There may be, then, a rating of importance, embedded in the design of the Web page. In actual examples from the district studied, one high school showed an animated cheerleader (a real student), going through an abbreviated routine on the school home page. The same school had relatively few females depicted in the computer lab. The placement of these visuals sends a message.

One junior high school chose to select two photos on their home page: two girls in ethnic dance costumes in one photo and two boys who had designed a technology-based art project (a magazine with their own photo on the cover) in a photo next to the first. On another page in the same site, the language lab had computers populated by male students only. Another page had girls pointing to the door of an administration office, while still another page had a photo of girls in their cheerleading costumes sitting on hallway stairs. A student viewing these pages within their school web site may get an impression of the school activities that are not proportionate to the actual participation of students or academic value. This is the nature of the *cybiotics* (Maboudian, 1999) in web design.

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Possible Interpretations of School Web Site Visuals by the Female Student

This section explores the possible interpretations of the messages in visuals based on student gender identity. Muffaletto (1994) explained that the visual is reproducing a pre-existing meaning, which communicates concepts to the viewer because there is a relationship between the concept and the way the viewer understands it. "It is through ideology, the relationship to the 'way' things are perceived to be, that the individual comes to know her/himself." (p. 300). This idea -- that the meaning of a visual is derived through the individual's relation to its concept based on ideology and identity -- is at the core of this paper and explains why the educator selecting visuals should attend to the *cybiotics* of the web environment, and, above all, to student identities.

An object, a visual, or any artifact we view holds a meaning that is pre-existing in society, but is also based on the way the individual views it in relation to self. The relationship is based on the social identity of the viewer. We have seen historical visuals depicting the female identity of other eras. It is often easier to comprehend the female identity through old photographs. The more common the meaning is in visuals, such as those which we see today, the more difficult it is to recognize the social construction of gender identities (Berger, 1998; Chandler, 1998). If we cannot recognize gender identities and stereotypical limitations of those identities, it is difficult to avoid those limitations. The acceptance of common inequities in gender differentiation in a school web site, can have far-reaching effects in other spheres and can become accepted as natural (Rakow, 1992; Simon, 1996).

Not only does the female identity exist, but it exists in diverse forms. "Within a picture, there are meanings assigned to colors, objects, relationships between objects, genders, races and ages." (Muffaletto, 1995, p.302). The interpretation of a visual depends on the social identity of the individual, which includes gender, and which directs behavior through a role-taking action that is culturally appropriate by groups within a society (Carspecken, 1996; Muffaletto, 1994; Simon, 1996; Wiley, 1994). The visual representation of female gender in the school web site needs to reflect multiple female identities. The identity of the female student may incorporate that of a cheerleader, or an *A* student...or it may not. The visuals in a school web site that do not address a variety of possible female identities limit students or exclude them. Visuals that present stereotypical representation of females are abundant in clipart and animated gifs (Knupfer, 1997). Photos that represent an absence of female students in an activity appear in web sites. The presence of stereotyping and the absence of female modeling in the area of computers both discourage female participation.

Semiotics, the system of signs (such as those in visuals) that have social meaning (Chandler, 1998), supports the examination of the social interpretation of the viewer. Awareness of semiotics when selecting a visual in a school web site can help the web designer understand the variations in student interpretations. According to Berger (1998) semiotic "Codes are highly complex patterns of associations that all members of a society learn. These codes or 'secret structures' in people's minds, affect the ways that individuals interpret the signs and symbols they find in the media and the ways they live." (p.26). Berger reminds us that codes can be so commonplace that they seem to be natural. The codes are not only the elements we see, but are the meanings we learn to give them.

According to Muffaletto (1995) these codes construct the identity of the reader. A juxtaposition of a male student at a computer working and a female student at a computer, turned in her chair, chatting, are meaningful outside of the context of the photographic moment and within the *cybiotics* of the school web site. The student reading a visual in the school web site will read not only what is there, but also what is not there. A male student sitting alone at a computer can mean the absence of a female counterpart. The absence of girls at computers may communicate an unspoken expectation of a behavior that literature describes as hidden curriculum (Apple, 1998; Carspecken, 1996; Noble, 1998). In this case, hidden curriculum can possibly prohibit females from using the computers in ways that the boys use them and, in a larger sense, could prevent female students from going into higher paying, prestigious jobs in computer technology fields.

What You See Isn't What I See (WYSIWIS): Semiotic Tools For Educators.

The information in Tables 1 and 2 is a variation of the model developed for the dissertation upon which this paper is based (Maboudian, 1999). The information within the grids is based on three sources on semiotic analysis, Van Zoonen (1994), Berger (1998), and Chandler (1998). These tools can help the educator examine visuals that are intended for a school web site. Using these grids as guidelines, the web

designer can observe the visual and ask a series of questions about possible meanings. While these matrices are not complete (more qualitative analysis should be done) they provide a start towards awareness of the possible interpretations female students may have regarding a visual.

The first step is to look carefully at the visual, viewing the elements as listed in Table 1 to become aware of the content of the visual. Possible codes exist in visuals that provide information about the meaning. Examine visuals for the following qualities:

Personal	Situation	Technical	Contextual
Posture	Background detail	Lighting	Composition on the page
Attitude	Props	Distance	Page format
Pose	Secondary characteristics in the shot	Definition	Relationship with Caption/Text
Gesture	Spatial relation between people	Contrast	
Activity	Clothing	Animation	
Eye contact with the reader			
Signs of social role or position			

Table 1. (Sources: Van Zoonen 1994; Chandler 1998)

As each element stands out, the next step is to ask questions about the elements and how they work to form meaning that can be understood, as seen in Table 2. Part of the process here is to identify what everyone would be able to see and determine how it fits into possible identities. Think about what various individuals with their own experiences might think of the visual. Don't be satisfied with one point of view. For instance, an old fashioned picture of a little girl in a schoolhouse raising her hand to answer a question could be interpreted in many ways. Her pose may be interpreted as being a good student. However, a student might see her as a teacher's pet. Another might see her as a sissy who can't play sports. Still another may find that the time frame of the forties presents a time when the female's role was limited.

Semiotic Analytic Structure
How do the visuals tell their story within the context of the web site? Think of the cybiotic elements related to the visual.
What are the physical attributes of the visual?
Commutative Test: Discover what the meaningful elements are by asking how the meaning would change if any element were altered in the visual.
How might the meaning of the visual tie in with stereotypical female identity?
What is the diachronic narrative of feminine identity across time?

Table 2. (Sources: Van Zoonen, 1994; Berger, 1998; and Chandler 1998)

Conclusion

The selection of visuals to be used in a medium that is an official representation of the school requires an understanding that a message sent is received and its meaning is then *interpreted*. The effect of visuals on behavior can be seen in something as common as our use of visual representation to decide which restroom to use. The unwritten sign on the door, marking it male or female, indicates the appropriate choice of restrooms based on gender. In a similar way, the visuals on the monitor screen influence the viewer.

As educators are learning how to create web pages, attention is given to the techniques of design and the technology of successful publication, with navigation and animation, "bells and whistles", and adherence to student privacy and to copyright laws. Is as much attention given to gender representation? While educators are aware that there is a lack of gender equity in computer technology, the use of the school Web page can possibly address the need for equity. The first step is to be aware that every picture tells a story and that the story may have a different ending for different viewers. The process for selecting the photos for publication on a school web site should be reviewed carefully. Photos of convenience, already in web-compatible format, or animated gifs that are "cute", should be examined for possible semiotic interpretations before putting them "up" for students to view.

More effective processes may be developed to select visuals that provide role models for equity, not simply to eliminate bias. Foucault (1984) described how architecture changes human behavior. Put a fireplace inside a home and the activities there change. The visuals in school web sites may also help engineer the role of the female student. Changes in stereotypes through visual representation on the school web site can engineer more choices that comprise the female student's identity. If not, then the continuance of stereotyping in the female student's representation can impede her progress in areas of computer use. Visuals can limit what the female student can and cannot do within the definitions of her identity (Knupfer, 1997).

By developing a process for the selection of visuals for school web pages that incorporates an awareness of student interpretation, and the effects of *cybiotics*, educators can avoid visuals that either stereotype students, or fail to provide an greater opportunity to expand student roles. While the selection of visuals for the development of a school web page is done with the good of the students in mind, there is more potential good to be done and potential harm to be avoided. The school web pages that comprise the site can promote female participation in computer-based activities by leading the way through visual representation.

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Within Student Comparison of ESL Acquisition-Through Content Between Virtual and F/F Seminar for ESL and Native Speakers' Negotiated Meaning

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Abstract: A comparison of virtual and F/F seminars for academic content and ESL acquisition by ESL and NS graduate students studied the nature of discourse analysis and negotiated meaning. On-line asynchronous WebCT bulletin boards allowed for recording and subsequent analysis of students contributions on-line. Tape-recordings of student live-seminar participation were analyzed and compared to virtual seminar participation by both NS and ESL students. Analysis of these negotiated meanings as well as formative and summative interviews and student diaries revealed a complementarity and synergistic relation between the on-line and F/F seminars. ESL and native speakers claimed efficient academic reading and writing improvement and that these gains transferred to their oral performance in the F/F seminar.

Introduction

Constructivist versions of academic content acquisition through a second language and second language acquisition through academic content learning place a strong emphasis on the opportunity for extensive utilization of all components of throughput (Carey, 1999a,b). These components of throughput include successive intake samplings from the input concurrent with successive interpretive attempts to assimilate the input in terms of their prior learning or schema and subsequently successive constructions of output in terms of interpretations of how that output will be received and perceived as appropriate output appropriate by the imagined audience and their interpretation of the output, Carey,(1999a,b). In my flow chart which conceptualizes this process, I propose that both ESL and native speakers of English may make successive attempts to interpret or assimilate the input or message in a seminar as provided by either an on-line bulletin board or a comment or question provided by a professor or student question in a seminar. Typically, in either case, the student will sample with successive intakes from the input to assimilate this information to existing linguistic and academic schema. An inadequacy in either linguistic or knowledge schema will result in disequilibrium causing successive iterations of this cycle of intake samplings in an attempt to comprehend the input.(assimilation) or modify the schema (accommodation) which constitutes learning. In this research, we tried to investigate and compare how ESL students and native speakers of English would negotiate meaning in either an on-line bulletin board communication or a Face to Face (F/F) mode of common course delivery. In particular, I wished to study the interaction of how inadequate academic language schema, which varied between ESL and native speakers, and inadequate academic content schema, which varied across students due of differing prior knowledge, would influence negotiated meaning by individual students and by collaborating students. I recognized that both variables constituted a continuum and a study of the interactions between these variables and on-line bulletin board activity or live face-to face seminars could provide insights on the role of negotiated meaning and language and content acquisition. The study of inadequate prior knowledge of language or content could also be represented as a continuum in terms of the degree of communication channel capacity that inadequate linguistic and academic schema might require. I also wished to further consider the continuum of automaticity of information processing that such diverse situations might entail. Carey,(1984).

A graduate seminar of 12 students engaged in graduate work on second language acquisition research (5 ESL and 7 native speakers) that had equal on-line and F/F required components allowed an opportunity to study how both ESL and native speakers would differ in their discourse between on-line bulletin board discourse and live F/F discourse and the interaction between the two. Students enrolled in the graduate seminar on Narrative as Inquiry were required to participate in both the on-line bulletin board virtual seminar (50% of course grade) and the live weekly F/F seminar (50% of course grade). Several of the ESL students were recent arrivals from Asia who had

minimal TOEFL scores of 580 and varied in their ESL communicative ability. Other ESL students included Europeans who had attained higher levels of ESL performance and had received their university education in English. The native English speakers all spoke a second language with considerable proficiency and taught that second language.

This design which I have used previously in research on other courses, Carey, (1999a,b; 1998); Carey & Crittenden, 1998 permitted a within-subject comparison of virtual seminar discourse and F/F seminar discourse for both ESL and native speakers of English. It also allowed between-subject comparisons of ESL speakers with native speakers in the virtual seminar as well as in the F/F seminar.

Method:

The 12 week graduate seminar on Narrative as Inquiry required that students engage in as much interaction and negotiated meaning on course content as possible in both the live seminar and the virtual seminar. Collaboration and co-operative learning rather than competition were promoted and joint projects were also encouraged.. Student readings included theories of learning flowing from the work of Piaget through to Rumelhart and other contemporaries who have borrowed so liberally from Piaget's genetic epistemology. In addition the course included detailed readings and discussion of second language immersion and language acquisition through content teaching. Students were encouraged to reflect on these readings to develop their own metacognition on their second language acquisition through academic content acquisition.

The virtual seminar which utilized WebCT asynchronous bulletin boards included activities to encourage students to engage in open discussion of the process of their second language process and how negotiated meaning and collaborative learning could contribute to a greater awareness of their second language acquisition process as well as their how their interactions and negotiated meanings facilitated their academic course content acquisition. All of these social cognition activities were recorded on the electronic bulletin board and submitted to detailed analyses. In addition, the live discussion and interchange was recorded in the live seminar and the nature and frequency of comments by ESL and native speakers interventions and participation were noted daily. In addition, informal interviews of both ESL and native speakers were conducted throughout the course and students were encouraged to write diaries and keep notes on the development of their awareness of their metacognition and how their acquisition of academic content and academic English were progressing as well as how they were differentially influenced by the two modes of seminars and their interactions with ESL and native speakers. All students were encouraged to work in a collaborative manner and to help each other in academic writing and gaining knowledge of the diverse cultures represented in the seminar.

Results:

Frequency of contributions:

Since the ESL graduate students were given strong incentives through grades and consistently encouraged to participate in both the virtual and live seminars it is instructive to compare their contributions in the two modes of seminar delivery. At the outset of the course the ESL students made many more contributions to the virtual seminar than they did in the F/F seminar. They also made far fewer contributions to the live seminar that the NS and the contributions they made were brief and in some cases they were either unable to make themselves understood or they were unable to understand the response by a NS to their contribution. In spite of he very positive and forgiving ambiance in the seminar, this inevitably led to some loss of face. In interviews they reported that contributing on the virtual seminar was far less anxiety inducing than contributing in the live seminar and unlike the live seminar it allowed them time to construct and verify their response to a message in a more productive way. This was also due to the "less embarrassing" situation in the virtual seminar which allowed them unlimited time to reflect on the question and to construct or choose an interpretation that seemed most probable. It also allowed them to reflect on the question and to consult other resources and then to construct and edit an appropriate response. These ESL students also found that this added time allowed them to function in a more optimal learning environment and to negotiate meaning and to collaborate with their colleagues and to engage in co-operative learning while improving their academic reading and writing in ESL. These students also claimed that this opportunity to negotiate the content in their ESL allowed for rapid ESL acquisition and that these learning transferred into the live F/F seminar.

They also claimed that the virtual seminar made it possible for them to acquire the idiom so that they could participate in the live seminar. Therefore, there was a noticeable increase in contributions by the ESL students such that by the end of the 12 week course, the ESL students contributions in the live seminar were at a level comparable to that of native speakers. This demonstration of how the virtual seminar allowed ESL students equality of access to learning on the virtual seminar and that this equality of participation facilitated their gradual increase in participation in the live seminar stands as a reminder of how technology can promote equality of education.

However, while this was most prevalent for the ESL students it was also true for all of the native speakers as well. They also found that the asynchronous discussions on the virtual seminar allowed them to be more thoughtful, less rushed and more conducive to expressing their well formed thoughts on issues and questions. Native speakers reported that their academic reading comprehension and writing also improved from activities in the virtual seminar. These students also claimed that this thoughtful discussions that was student centered allowed for the emergence of a certain sense of a community of scholars who claimed that they felt more autonomous and empowered to discuss important course content issues and this allowed them to get to know each other and their different perspectives on academic issues reflecting their diverse prior knowledge and cultural backgrounds. Moreover, this transferred to the live seminar so that it greatly improved their level of discussion in the live seminar. This spontaneous practicum in the socialization of language and learning was an added benefit of the on-line activity.

Other measures of change in the 12 week course revealed in the interviews.

In interviews all of the ESL students found that the virtual seminar was particularly conductive to facilitating both their ESL acquisition and academic content acquisition. They all claimed that SLA through content immersion was the most effective way to improve their academic reading and writing. They also claimed that the on-line writing greatly facilitated their oral contributions in the live seminar because they would be thinking and speaking outloud as they composed and recomposed their messages to post on the bulletin board. In addition, the responses they received to their communications greatly increased their self-confidence in their ability to both express the academic content and their second language. The ESL students also offered their opinions as to the superiority of this course in helping their learning compared to other graduate courses they were concurrently enrolled in. Two of the five ESL graduate students either dropped other conventional graduate courses or changed their registration to audit status. All ESL students claimed they acquired more ESL academic reading and writing as well as more academic content in this combined live-virtual graduate seminar.

In interviews of the native speakers there was a consensus that the virtual seminar greatly increased the opportunity for the students to work collaboratively and to negotiate meaning and to become more aware of their metacognitive skills. They also claimed that they learned more than in a conventional course because they were more actively involved and the participation in the socialization of learning both academic language and content greatly facilitated their progress. Several native speakers also claimed that working with and watching the progress of he ESL students helped hem to understand their own growth in academic reading and writing to a some degree.

All students agreed that the opportunity to post their term papers on the bulletin board so that all other students could collaborate and offer opinions on improving each term paper was highly useful for added learning and that the collaborative and interactive learning model promoted a higher level of learning for all students. Students also agreed that the flow chart model was a good representation of how they felt they processed t he information and that the constructivist orientation was a heuristic metaphor for explaining how they learned.

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VIRTUAL INTERACTIVE WORKSHOP:
a pedagogical art education view into the computer lab

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Abstract

This paper deals with educational issues one faces while interacting in digital environments. The field of art education in these environments as well as the new concepts that involve the processes developed in their use are the main focus of this study. The main concern is to verify how and whether the digital environments can provide a practice that is strengthening and effective and whether they can make it possible a teaching-learning process with excellence. Knowing how these processes engender the cognitive development of the students concerning the possibilities that these computer based environments are able to offer is our challenge. Are these computer mediated environments able to help develop creation in a constructive sense? Cyberspace, multimedia, online are every day words in the contemporary world. How can educators grasp these meanings in order to develop ways to fully integrate them into their pedagogical issues without simply transposing old practices into new environments?

Introduction

Digital technology is being used more and more by contemporary artists. Web art, net art, electronic art and other new forms of artistic production are subject of discussion by art educators who are concerned with the use of this new technology in their classrooms.
This is a project which tries to articulate three areas of knowledge, integrating aspects of art-education, developmental psychology and computer science to make up a work plan based on the reference theories in each one of those areas. We are trying to answer some questionings that justify the insertion of the digital technologies as a work perspective in the pedagogical field. We are observing the educational processes in the construction of cognitive possibilities developed by the students during the interaction with the computerized environments.

Digital Technologies in Education

This study investigates how the insertion of the education professional can happen in a field that is new and that presents challenges in the construction of knowledge specific of its field. This occurs exactly due to the characteristic mobility of the telematic environments in order to place in this field the teacher's possibilities to help develop in the student the artistic knowledge, which brings about an aesthetic awareness.
This educator should be a competent critic for whom the artistic and aesthetic knowledge bring new possibilities which can be seen, according to *Axt*, as a "*possibility to recover the already organized in the paths that have been already planned, which can be always retaken by the thought that returns, and it is worth to say that it returns on itself in the construction of the stability*".
This path of construction of knowledge in the language described by *Axt*, will be retaken by us in issues that deal with the output of the mental activity regarding the transformations of the object in the construction of

the virtual/possibilities The meta reflection concerning the person's own work and the others' makes it possible to make a connection among the knowledges and practices resulting in output movements through the visibility of the transformations.

In The Virtual Interactive Workshop we intend:

To use the new technologies of the information and of the telecommunication aiming at an integration of a synchronous combined with an asynchronous pedagogical process that facilitates the development of a sensitive, imaginative, and critical individual.

To observe how the new technologies of the information and of the telecommunication are used by the students while interacting in them in the process of construction of cognitive possibilities, the invention and the creation.

To investigate the possibilities of the educational process in computerized environments, considering their specificity.

To investigate the reconstruction and development of a critical vision, and the possibility of the students to capture the conflict among the several solution alternatives in a computerized environment where hypertextual thinking allows multiple possibilities.

To investigate the new educational environments in relation to the opportunity of decision they offer to the student, which implies working with divergent answers.

To question and to identify the new computerized environments and the interaction possibilities in the construction of a practice that allows to develop the expression and the communication in the visual arts, the significant appreciation and the understanding of the visual arts as cultural and historical product under a contextualized and reflexive perspective.

To investigate these new computerized environments and the new approaches in art pedagogical projects, as well as the development of concepts concerning the real and the virtual when working in the cyberspace.

The Context

Cyber is one of the most used prefixes in the nineties. Those who want to transcend the use of the computer and travel into the cyberspace are the cybernauts, members of an emergent culture, the cyberculture.

How to assimilate these transformations and to work with these technologies, which are already integrated into the daily life of our students?

Litwin works on a focus of the computerized society in which the computer is already inserted in people's life, and consequently in the pedagogical action, as she states: "*It worries us seriously that a lot of proposed reforms don't consider the changes that were produced because of the technological developments, and think the innovation as the use of the technology especially done for the classroom, without realizing that it is already incorporated, that it is part of the culture of the classroom and that the information that derives from it should be first deconstructed as part of the ruptures that should be created to favor critical thinking*".

Litwin's idea finds reinforcement in the schematic differences between modernism and post modernism presented by the theorists where one sees a change in paradigms now facing dispersion, deconstruction, antithesis.

The change from the modern copper phone cable to the post modern optical fiber increases enormously the flow of information. The educator's role is in search of redefinitions in this world of amazing speeds.

On the other hand, the student is immerged in a culture of the imagery, in which the culture of the imitation (a such perfect clone whose difference between the original and the copy is almost impossible to notice) is itself the focus of innovation, and it is starting to suffer effects of some tendencies of its own phenomenon. One of these is the problem of the reproductivity in the era of the mass consumerism. The more an original is reproduced, the more the price of its original work goes up. This consumerist aura extends to all other things. It is the price of the nostalgia - memories of what was manufactured yesterday. There is an image consumerism and what is reproduced occupies the place of reality or it is substituted as a hyper reality. We live on what was already lived and of what is being reproduced.

How can an art educator deal with all these new concepts?

Pierre Lévy says that: "*In the digital world, in the distinction of the original, and of the copy there is a lot that has lost any pertinence. The cyberspace is mixing the notions of unity, of identity and of location..... we are at the same time here and there thanks to the communication techniques and of telepresence*".

One of the post modern world symptoms that can reflect on education it is what is called zapping, or the zero conscience. The remote control, the multiple TV cable channels, the satellite transmissions generate such an abundance of options that one goes through this continuous and impatient change of channels without going deep into anything, it is like making a collage of one's own life, transforming the creation of the post modern life into an endless amnesia, according to some authors.

Another phenomenon diagnosed in the virtual world is *lost in cyberspace*. The infinite clicking of the mouse in the search of information, resembles *zapping* in the search of other channels.

This study focus on the computerized environments and telematics due to the fact that research in this area demonstrates that the educators are concerned and want to know the possibilities of this technology that presents new developments every day, fostering and enlarging the possibilities of the traditional interactions in the educational environments.

Development:

Interactivity, the arts, and computer technologies seem to be reshaping the art class, the computer lab and education .

We are working at The Virtual Interactive Workshop challenging the students to look for their own answers to the questions. The activities developed by them in the project are interactions in the computerized environment. They use the Internet for their research.

The use of the electronic means of communication makes it possible to propose themes for discussion involving the visual reading of the own students' environment and of the ones that they interact with during the process.

Students dialogue with the researcher, they send their folios and their reflections about their own production, and they chat among themselves, too.

The data picked in the sessions of the students' interaction in these environments are registered and analyzed.

They interact and use the ARTEDUC site as their electronic folio.

The site Arteduc http://www.penta.ufrgs.br/edu/telelab/arteduc/inicio.htm besides facilitating immediate access to several sites of interest for people involved with art teaching/learning has links that are specific about subjects to art teaching in a post-modern world and for the Virtual Interactive Workshop.

Students' interactions with the on-line material in electronic addresses (museums, digital artists, art schools, and others) that foster work in art education lead to a development of concepts favoring aesthetic perception.

Students' art production is done with softwares such as Corel Draw, Corel Photo Paint and the use of the available hardware in the laboratory including scanner, printer and plotter.

All students have their own individual directories in the hard disk. We use the process-folio approach, where all the student's work is saved and a part of the process to be evaluated. These folios are made up of graphic works they make, material they research on the Internet, reflections regarding their own production, projects they write and send to their peers. Students go through their production and make up their own personal folders and include a reflection about it.

Outcomes:

Some of the expected outcomes present some partial data up to now. It can be observed, starting from the production of the students that take part in the research group that:

There is an increase in the awareness processes related to the works of the universal culture which can be accessed in the world wide web - Internet.

The computerized telematic environment facilitates and helps, through its wide access, the analysis and the taking up of decision regarding the choice of works for the development of the art works.

Students appropriate with dexterity of the works on the net and they work on transformation processes, which includes deconstruction, construction and reconstruction of works. The students' own local cultural products are shown integrated in the reconstruction processes and outcomes.

These environments and the possibility they offer of exchanging information with students from other towns and countries seems to increase the feeling of citizenship.

Students seem to be able to grasp the new possibilities offered by the computerized means and of the processes that they make possible. This gives birth to what has been called the planetary hypersubject who transcends the mere technological system of connections.
The work accomplished by the students using the electronic mail and sites of the Internet shows that there is an understanding of the dimensions of the communicational neotechnologies.
The interaction in the computerized environment seems to favor the development of cognitive processes which engender creative thinking.

ALICE - *a case study:*

Girl - 12 years old - 6th grade. Public school. No experience with computers before starting classes in the Virtual Interactive Workshop Project.
In the 1st and 2nd classes she makes *scribbles* on the screen with the mouse and in the 3rd one she starts drawing a human figure.
In the 5th class the design of the human figure is getting to be more complete.
In the next classes she prints some pictures of Sandy Skoglund's work displayed on the Getty site.
As a next step, she makes interferences on these images on the screen changing the background and the form colors.
After a field trip to some of the town's landmarks, Alice designs a simple form of construction that she names: the Grape Festival Pavilions, (a traditional Fair in town) to which she applies resources of the software and obtains very interesting overlapping effects.
From the 38 to 40 classes, besides the gray scale of tones, she works on a whole set of images of the house which changes into different geometrical forms and she uses distortion.
In the 43 and 44 classes she goes back to the theme of the house, naming the file *Stone*, as a reference to the *Stone House*, a tourist attraction that she visited in her town and makes 7 works using the same theme. She applies effects and modifies her own work changing the color, the textures, the form, and so on.
This girl, who started in the project doing *computer scribblings*, a conduct which we have identified in our Master's dissertation: *The Graphic-Plastic Development of Children in Interaction with the Computer*, shows a new attitude facing her work in a real researcher manner. She accomplished, in the 63rd class, 8 works during the period of the class, always looking for new graphic solutions for the same work. These works show *the reconstruction and development of a critical vision, and the possibility of the students to live the conflict among the several solution alternatives in a computerized environment.*
At first, Alice's initial drawing of the house revealed a very simple front view form, not even going into any tridimensional perspective. Later on, this is reached through the effects that the software presents which she got to when looking for new possibilities.
This large number of attempts seeking for new solutions of problems leads us to believe that these digital environments favor the search for divergent answers.
We have also observed in this study the fact that to work on an image and try another way of representation from the same original work, without affecting its original form, which can be saved untouched, seems to help the processes and start a delightful and intense experimentation.
The hypertextual availability of the environment as well as the multiple choices of the graphic software allow students to take up their own decisions thus constructing new possibilities.

Conclusions:

New technologies bring about anthropologic changes. These can be identified in the re-presentation of objects, the simulation of something that does not exist, and in that new ways of communication that bring about change in the educational processes.
In which ways do these changes affect our object of study?
Will these processes be able to help develop potentialities such as perception, imagination, observation and sensitivity?

Will they foster new ways of knowing and new ways of constructing meaning?
Can the processes of imagery reconstruction, spatial re-organization be improved in the digital world?
Certainly we cannot think of a synchronous education without contact with the outside world anymore but we also cannot accept an asynchronous education in the traditional ways. Thus, research in this field must be continued.
We don't have answers to all these question yet., but we do have a lot of questionings to conclude.

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42A

Fostering Equity in Pre-College Computing Classrooms

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Abstract: Project *FOCAL* Point is a multi-strand project designed to increase female participation in the computing sciences. The project targets two crucial groups: high school computing teachers and female high school students. Features include a two-week teacher workshop, where teacher participants are introduced to technology-related gender issues and collaborate to develop female friendly technology lessons, and a one-week Computer Camp for Young Women, during which teacher participants hone their gender equitable teaching skills. This paper focuses on the teacher participant responses and reactions to the two-week teacher workshop.

Few people doubt that technological skills will become increasingly important as our country enters the 21st century. In view of the high percentage of Caucasian males currently employed in the computing fields and ongoing concern with affirmative action, businesses continue to seek out qualified women and people of color. However, despite acknowledged career opportunities and known financial advantages, these groups continue to be under-represented in the professional work force and in technology-related post-secondary education. The nation suffers, too. Currently, there is a critical shortage of information systems professionals, a shortage that is expected to escalate in the near future at least. We simply cannot afford to have a major source of talent remain largely untapped.

Project *FOCAL* Point Implementation

Concerned educators must question the reasons for the continued gender imbalance in the computing fields and search out avenues for addressing the equity problem. Project ***FOCAL*** Point is one such avenue. The project seeks to get more females into the educational pipeline by working with two essential groups: pre-college computing teachers and adolescent girls. This paper focuses on the first group.

Specific project objectives as related to the teacher participants are to:

1. Acquaint teachers with gender issues as related to computing.
2. Help teachers become aware of unconscious biases they may possess regarding the culture of computing.
3. Introduce teachers to instructional practices known to appeal to women and girls.
4. Provide teachers with technology-related content knowledge and skills.

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The detailed objectives were addressed mainly through a two-week summer workshop. Two cohorts of teachers participated in the summer workshop, 7 teachers (4 men and 3 women) in 1998 and 13 teachers (3 men and 10 women) in 1999. The first cohort was composed almost exclusively of senior high school teachers; the second cohort was composed almost exclusively of middle school teachers. All volunteered to participate in the project, and all reported that they taught technology-related education in their home schools.

The first goal of the workshop was to expand the teacher participants' computer comfort zone and to help them identify more positively with the computer culture, so that they might more effectively teach all their students. The second goal was to acquaint them with features that render a lesson more female-friendly, so that they might more effectively teach their female students.

The first week of the teacher workshop was a blend of training in gender issues, computer and information systems concepts, and computer and network applications—with some portion of each day devoted to each dimension. Workshop instructors incorporated a variety of active and constructive instructional strategies and delivery methods, modeling the teaching behaviors we hoped to inspire. During the second week of the workshop, teacher participants tested their female-friendly technology lessons with middle and high school girls attending a Summer Computer Camp for Young Women.

Activities designed to raise awareness of gender bias ranged from drawing a computer scientist to developing sensitivity to gender-biased language. The active learning experiences were designed to arouse awareness of gender issues as well as inform practice directly. Guest lectures, videos, and workshops rounded out the exposure to gender issues. A concrete models workshop (where groups work together to write directions for constructing a Tinkertoy machine) conducted by the authors, for example, has repeatedly revealed consistent (and disturbing) patterns of male-female interactions and role choices when mixed gender groups work to solve a technical problem.

As enhancing teacher participants' skill and knowledge of computer and network applications is a major project objective, the teacher participants early learned to navigate the university network. Next, they practiced with the university's e-mail software and basic Internet searching. Workshop instructors stressed the importance of locating gender-related web sites and evaluating sites and information relative to their appeal to girls or women. During the first summer, all teacher participants learned the basics of web page production. The second-summer curriculum was more varied; options included several programming languages, word processing, and presentation graphics as well as web page development.

Specifically, the evaluation study of Project ***FOCAL*** Point attempted to answer the following teacher-related questions:

- What changes in computer attitudes did teachers report as a result of their participation in Project *FOCAL* Point's two-week teacher workshop?
- What changes in computer skills did teachers report as a result of their participation in Project *FOCAL* Point's two-week teacher workshop?

The Computer Attitude Scale (CAS) was used to measure changes in computer attitudes. The 40-item CAS has been shown to be valid and reliable (Loyd & Gressard, 1984; Loyd & Loyd, 1985). The CAS is composed of four 10-question sub-scales designed to measure computer anxiety, confidence, liking, and perception of usefulness. The mean for each sub-scale could range from a low of 10 to a high of 40. Items on the CAS with negative wording were re-recorded so that for all items, a higher item score indicates a more favorable attitude. The teachers completed the CAS on the first day of their project participation and again on the last day of the summer program.

Changes in skill levels are based on self-report. Data for the skill-related questions were collected on a daily basis as the topics were covered during 1998 and on the last day of the two-week workshop in 1999. As the format of the teacher workshop changed dramatically from 1998 to 1999 (a product of our formative evaluation), the two samples cannot reasonably be combined. Moreover, the small sample size of each cohort precludes inferential statistical analysis. Hence, the cohorts are reported separately, and the analyses are limited to descriptive statistics.

Evaluation Study Results for Cohort One

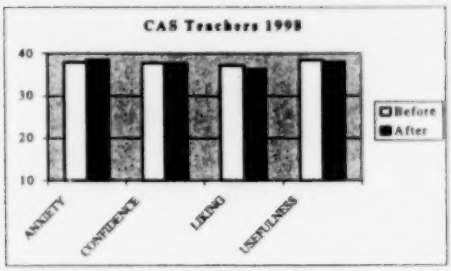

Figure 1. CAS Results Cohort One

The results for the cohort one CAS are shown in Figure 1. Given the high initial scores (means of 37-38) and the audience, we did not anticipate dramatic changes; that expectation was borne out. The mean for computer anxiety increased slightly and the mean for computer confidence remained constant. In contrast, the mean for computer liking and usefulness decreased slightly. The individual teacher results for the computer usefulness sub-scale are shown in Figure 2.

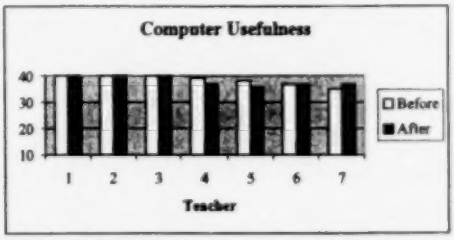

Figure 2. Individual Results—Usefulness Sub-scale

The declines, however slight, surprised us and prompted further analysis. Some of the decline (or lack of increase) might be attributed to the teachers' expressed difficulty in reading the negatively worded questions. For example, Teacher 4 strongly disagreed with the statement "Computers will not be important to me in my life's work." (a question in the usefulness sub-scale) on the pre-test and strongly agreed with the statement on the post-test. Although it is possible that the two-week workshop effected such a dramatic negative change, it seems unlikely. A more plausible explanation is that the participant misread the question.

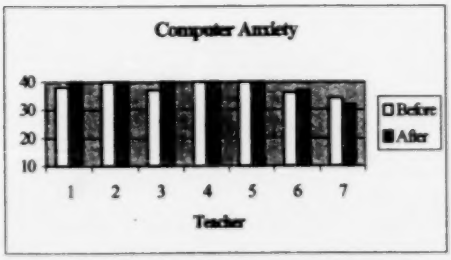

Figure 3. Individual Results—Anxiety Sub-scale

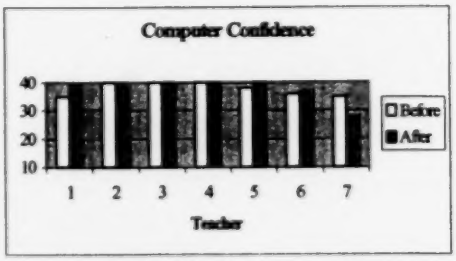

Figure 4. Individual Results—Confidence Sub-scale

The results of the anxiety and confidence sub-scales are shown in Figures 3 and 4. Examination of the data shows that six of the seven teachers uniformly responded positively on both sub-scales, with many scores placed at the maximum possible. The results for computer liking sub-scale are shown in figure 5. Note that other than the small dip for Teacher 4, the results are uniformly positive—again except for Teacher 7.

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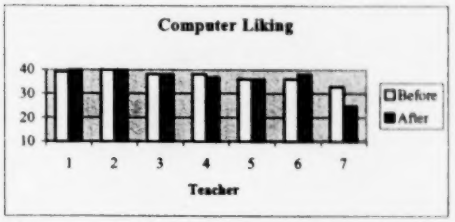

Figure 5. Individual Results—Liking Sub-scale

Teacher 7 was a Technology Education teacher, who by had done little with computers except for AutoCAD prior to his participation in the workshop. By his own admission, he found himself challenged with the content and the notion of teaching that content during the camper week. He, in fact, opted out of teaching web page development to the campers in his "class," teaching them instead to use AutoCAD. This teacher's experience prompted a change in the format of the second workshop. In 1999, teacher participants worked in teaching teams rather than each participant having his or her own "class" of two or three students.

The teachers were asked to complete a self-assessment of their computer experience on the first and on the last day of the two-week workshop. Figures 6 to 9 show the before/after difference in reported computing experience levels. A comparison of the before and after means show that perception of electronic mail and web

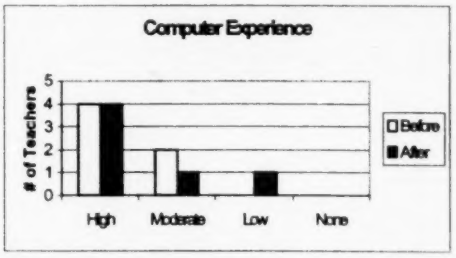

Figure 6. Computer Experience

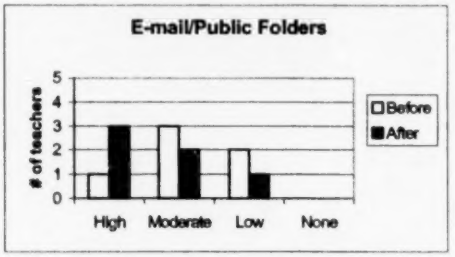

Figure 7. E-mail/Public Folders

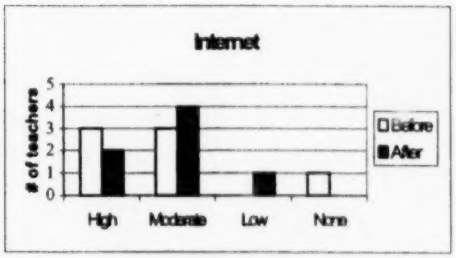

Figure 8. Internet

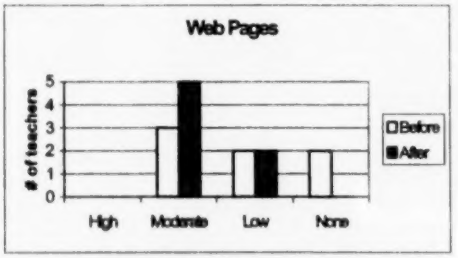

Figure 9. Web Pages

page development experience increased dramatically. The latter statistic is not surprising since five out of seven teachers (71%) had not constructed a web page prior to their participation in the summer workshop. Ability with Internet searching increased slightly, and assessment of general computer experience dropped slightly. Since perceptions of experience were (unnecessarily) tied to other project evaluations and therefore reported anonymously, it is not possible to definitively attribute the dip to Teacher 7. It is possible to hypothesize that he overestimated his experience level before he observed what others were doing.

Not surprisingly (given the audience), 83% (five out of six teachers) of the respondents agreed or agreed strongly to use e-mail in their teaching. More interesting would be the reasons for the lone respondent who responded in the negative. The teachers astutely observed that "some female students might not want to ask the

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questions in person, but they would ask questions through the e-mail." The authors add that this observation is probably true for more reticent males, too. From these responses, it is possible to conclude that e-mail will play an important role in the future teaching of the respondents. Five out seven teachers, (71%) responded that they wanted to use Internet searching in their classroom.

Evaluation Study Results for Cohort Two

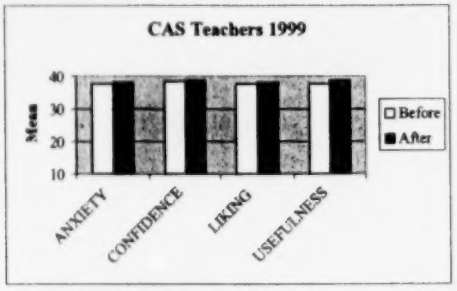

Figure 10. CAS Results Cohort Two

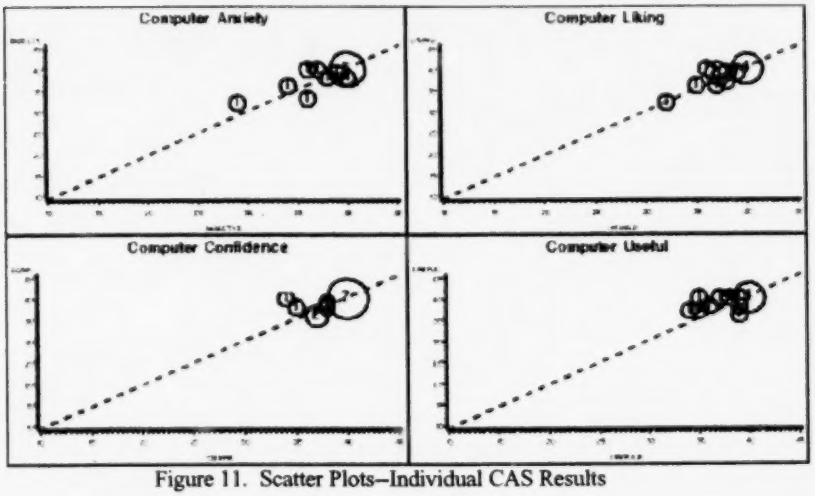

Figure 11. Scatter Plots–Individual CAS Results

Figure 10 shows the aggregate picture for the scores on the CAS. The high initial responses all increased over the two-week span of the workshop. The scatter plots of the individual responses suggest that a ceiling effect was in place, with the majority of the scores clustered near the maximum score of 40. Moreover, almost all scores fell above the reference line, indicating a higher post-test score than pre-test score.

As indicated earlier, the format of the 1999 workshop varied from that of 1998. During the inaugural year, all participants studied and taught the same topics (with the exception of the lone teacher who taught AutoCAD). In 1999, all teacher participants were introduced to the university network and email software during the introductory sessions. Thereafter, they worked in small groups; each teacher participant studied and taught two classes. The results for the small group instruction is reported in table form rather than charts as the small numbers render the data easy to interpret.

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The level of email experience is shown in Figure 12 and the comfort level of teaching email is shown in Figure 13. The movement out of the "low" category is heartening, especially as reported in the participants' comfort level with teaching the topic. Moreover, eight participants strongly agreed and four moderately agreed with the statement that they would use email in their teaching.

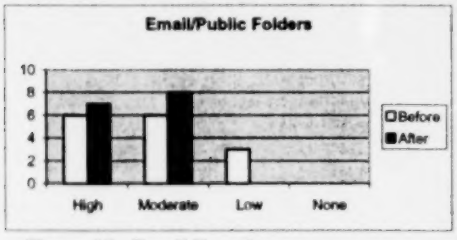

Figure 12. Email Experience

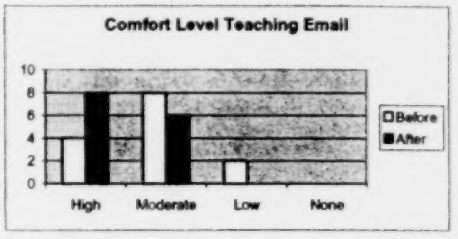

Figure 13. Comfort Level Teaching Email

Skill/ Experience Level	Before				After			
	High	Moderate	Low	None	High	Moderate	Low	None
C++		1			1			
HTML			2			2		
Visual Basic		2	1			3		
Word	2		2		3	1		
Internet	2	4			4	2		
Web Page	2	1	3	1	2	4	1	
Power Point		2	1			3		
LegoLogo	1	1			1	1		

Table 1. Level of Skill/Experience

Comfort Level Teaching	Before				After			
	High	Moderate	Low	None	High	Moderate	Low	None
C++		1			1			
HTML		2				2		
Visual Basic		1	2		1	2		
Word	1	1			2			
Internet	3		2		5			
Web Page		2	3	1	1	5		
Power Point		1	2		2	1		
LegoLogo	2				2			

Table 2. Comfort Level Teaching

The movement completely away from the "low" and "none" categories and into the "high" category is encouraging. Moreover, 19 respondents strongly agreed and 4 respondents moderately agreed that they would incorporate the topics they studied and taught in their instruction. In conclusion, we believe that the data support the hypothesis that the workshop enjoyed some success in accomplishing its objectives.

Major funding for Project ***FOCAL*** Point is provided by National Science Foundation Programs for Gender Equity grant HRD-9711023.

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